ENVIRONMENTAL HEALTH SERIES
Air Pollution

PB195865

APTD 68-8

SAROAD

STORAGE AND RETRIEVAL OF AIR QUALITY DATA

SYSTEM DESCRIPTION AND DATA CODING MANUAL

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

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5542

STANDARD TITLE PAGE FOR TECHNICAL REPORTS	1. Report No. APTD 68-8	2. Govt. Accession No.	3. Recipient's Catalog No.

4. Title and Subtitle
Storage and Retrieval of Air Quality Data
System Description and Data Coding Manual

5. Report Date
June 1968

6. Performing Organization Code

7. Author(s)
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8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Consumer Protection and Environmental Health Service
National Air Pollution Control Administration
Cincinnati, Ohio 45226

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. Sponsoring Agency Name and Address
Same

13. Type of Report & Period Covered

14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstracts

The purpose is to enlist the participation of other Federal, state, and local agencies in the Air Quality Data Bank. As plans for the development of a more flexible data handling system began to materialize, those involved became increasingly aware of the potential of the system. It seemed desirable to provide a system capable of handling data from other than "in-house" air monitoring projects. The current system, thus forms the basis for a national "Air Quality Data Bank". For simplified nomenclature, the system is referred to as SAROAD, i.e., Storage and Retrieval of Air Quality Data. The type of data acceptable to the system is explained and a detailed description of the the available types of retrieval formats is given. It is anticipated that the retrieval phase will be expanded in line with the overall needs of the participants.

17. Key Words and Document Analysis. (a). Descriptors

Air pollution
Data processing
Data storage
Data retrieval
Data
Computer programs
Environmental surveys

17b. Identifiers/Open-Ended Terms

Air monitoring data
Air quality data
SAROAD
Storage and Retrieval of Air Quality Data (SAROAD)

17c. COSATI Field/Group 13/02, 09/02

18. Distribution Statement	19. Security Class (This Report)	21. No. of Pages
Unlimited	UNCLASSIFIED	47
	20. Security Class. (This Page) UNCLASSIFIED	22. Price

FORM NBS-867(1-70)

STORAGE AND RETRIEVAL OF AIR QUALITY DATA
(S A R O A D)

SYSTEM DESCRIPTION AND DATA CODING MANUAL

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Bureau of Disease Prevention and Environmental Control
National Center for Air Pollution Control
Office of Technical Publications
Cincinnati, Ohio 45227
June 1968

Public Health Service Publication No. APTD-68-8

ABSTRACT

The systems for coding sampling site locations, and for coding air quality data for inclusion in the National Center for Air Pollution Control data bank are described. The forms to be used in reporting data are explained. Retrieval programs available for obtaining data summaries are briefly discussed.

KEY WORDS

Air quality data
Data bank
Data systems
Monitoring networks
SAROAD

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STORAGE AND RETRIEVAL OF AIR QUALITY DATA

INTRODUCTION

The public has become increasingly aware, in recent years, of the problems associated with atmospheric pollution. The Public Health Service initiated a modest program of research and technical assistance related to air pollution problems in 1955 with the passage of Public Law 159, and air pollution control activities have continued to expand over the years. Passage of the Clean Air Act (Public Law 206, 88th Congress) in 1963, and the Motor Vehicle Air Pollution Control Act (Public Law 272, 89th Congress) in 1965 indicate the intent, on the part of the Federal Government, to play an ever-increasing role in air pollution research and abatement activities.

A large part of the public monies spent on air pollution research and control activities by Federal, state, and local agencies is aimed at monitoring the ambient air. In the past, and to some extent even at the present time, the primary objective of these air monitoring activities is to provide information relative to the nature and extent of air pollution. It is anticipated that air monitoring and the resulting data will play a continually increasing role in the future in determining the type and extent of control programs used to ensure conformance with appropriate air quality standards.

Air monitoring programs are yielding increasing quantities of data. Often the data remain unanalyzed and unpublished or, if published, are presented only as endless tables in a report. Such data must generally be subjected to extensive statistical analysis to realize the maximum amount of information. Generally the quantity of data is so great that an automated method of data processing and analysis is necessary.

As early as 1958 the Public Health Service saw the need for a computer-centered system for the storage and retrieval of air quality data in support of the National Air Sampling Network (NASN). Initially, data was stored on punched cards and the computer was used for retrieval purposes only. More recently the system was changed to provide for the storage of data on magnetic tape; and as

plans for the development of a more flexible data handling system began to materialize, the tremendous potential of the system was realized. Because state and local agencies are mounting sampling networks that will soon surpass NCAPC's networks in volume of data generated, a system capable of incorporating data from other than in-house air monitoring projects has become necessary. Separately, these individual state and local networks are intended to monitor the local environment. Collectively, the networks can provide a broad base of information on nationwide air quality by becoming integral parts of a composite sampling network many times more extensive than the original NCAPC networks. In addition, requests may be made by the contributing agencies for summaries and analyses of their data that may be beyond the scope of their facilities. Summaries of data from other communities in the same population class and/or geographic area also can be compiled to establish a context in which a local agency may evaluate its own program and progress. Much of this value will never be realized if the data are not routinely reported to a central data retrieval system in uniform format. The system described herein therefore, forms the basis for a national "Air Quality Data Bank." The system is referred to as SAROAD, i.e., Storage and Retrieval of Air Quality Data. The SAROAD system is designed to permit rapid retrieval of air quality measurements made anywhere in the United States; thus, data entered in the system become readily available for use in a broad range of research projects.

Those familiar with the status of air quality data handling activities at the Federal, state, and local levels, have long recognized the need for standardization of procedures. Data handling procedures range from recording results in loose-leaf notebooks to highly automated systems employing punched cards and magnetic tapes in conjunction with high speed electronic computers. In many instances the inability to handle air quality data quickly and efficiently restricts their full utilization in air pollution research and control activities. The purpose of SAROAD is to correct some of these deficiencies and demonstrate solutions to data handling problems.

DATA IDENTIFICATION AND CODING

The SAROAD system consists of comprehensive identification codes for stations and pollutants, a set of data reporting forms to accommodate the variety of sampling procedures and facilitate the transfer of data to punched cards, input programs and the resulting data file, and output programs used to list, summarize, and analyze the stored data. Input to the system is basically from punched cards. The permanent data file is maintained on magnetic tape. Retrieved information may be tabulated by an on-line high-speed printer, punched onto cards, or recorded on magnetic tape. The SAROAD system is designed for use with the Honeywell 400 computer, but could easily be adapted for use on a comparable or larger computer.

The principal purpose of pollutant identification coding in the SAROAD system is to facilitate storing and retrieval of air quality data. By redefining the assignment of numbers in the upper categories of the data classification system, companion systems could be set up to handle other types of data such as emissions inventory data, air pollution effects data, and socioeconomic data. These systems could prove worthwhile, but should be designed as separate, parallel systems, not as appendages to the air quality data file system.

To store large quantities of diverse information on magnetic tape and ensure the preservation of unique identity, numerical identification codes are employed. These codes identify location of sampling stations, specific pollutants, and the sampling and analytical methods used in making the determinations.

STATION LOCATION IDENTIFICATION

The SAROAD system employs an eight-digit numerical code to identify specific sampling locations:

State

State names are arranged in alphabetic sequence and assigned numbers from 1 to 52. To maintain consistency, both the District of Columbia and the territory of Puerto Rico are considered as separate states.

Area

Within each state the names of all incorporated areas with a population of more than 2500 and all counties are arranged alphabetically and assigned a four-digit number. County codes are used only for stations located outside incorporated areas. To provide sufficient flexibility to accommodate new urban areas, the first city (or county) in each state is assigned the number 0020, and next 0040, etc. Such a procedure enables the addition of up to 19 names between any two names now on the list. Thus, any city or county in the country is identified uniquely by a six-digit number. For example, the numerical code for Burmingham, Alabama, is 010380; Cincinnati, Ohio, is 361220; and the unincorporated area of Hamilton County, Ohio, is identified as 362720. A sample page of the station identification code is shown as Figure 1. A detailed station coding manual has been prepared and published as a separate publication.*

Site

Specific sampling sites are designated by a two-digit number that permits a maximum of 99 sites in each city or county area within a state.

Site Identification Record

Prior to the acceptance of any data for inclusion in SAROAD, the agency responsible for collecting the data will be requested to complete a site location identification sheet (Figure 2). This information is primarily descriptive, but provision is made for the incorporation of a geographic coordinate system that will physically pinpoint site locations by latitude and longitude. After thorough verification this information is keypunched and added to the master site identification file, which is maintained on a separate magnetic tape. The magnetic tape format of site identification information is shown in Figure 3. A typical example of site information retrieval is shown in Figure 4.

POLLUTANT IDENTIFICATION

To permit maximum flexibility of both storage and retrieval, each pollutant

*SAROAD Station Coding Manual. U.S. Dept. of Health, Education, and Welfare, Public Health Service, NCAPC, Air Quality and Emission Data Program, 5710 Wooster Pike, Cincinnati, Ohio 45227.

ARKANSAS

ARKADELPHIA	04 0020	*GREENE	04 1020
*ARKANSAS	04 0040	HAMBURG	04 1040
ASHDOWN	04 0060	HARRISON	04 1060
*ASHLEY	04 0080	HELENA	04 1080
BATESVILLE	04 0100	*HEMPSTEAD	04 1100
*BAXTER	04 0120	HOPE	04 1120
BENTON	04 0140	HOT SPRINGS	04 1140
*BENTON	04 0160	*HOT SPRING	04 1160
BENTONVILLE	04 0180	*HOWARD	04 1180
BLYTHEVILLE	04 0200	*INDEPENDENCE	04 1200
*BOONE	04 0220	*IZARD	04 1220
BOONEVILLE	04 0240	*JACKSON	04 1240
*BRADLEY	04 0260	JACKSONVILLE	04 1260
BRINKLEY	04 0280	*JEFFERSON	04 1280
*CALHOUN	04 0300	*JOHNSON	04 1300
CAMDEN	04 0320	JONESBORO	04 1320
*CARROLL	04 0340	*LAFAYETTE	04 1340
*CHICOT	04 0360	LAKE VILLAGE	04 1360
*CLARK	04 0380	*LAWRENCE	04 1380
CLARKSVILLE	04 0400	*LEE	04 1400
*CLAY	04 0420	*LINCOLN	04 1420
*CLEBURNE	04 0440	LITTLE ROCK	04 1440
*CLEVELAND	04 0460	*LITTLE RIVER	04 1460
*COLUMBIA	04 0480	*LOGAN	04 1480
CONWAY	04 0500	*LONOKE	04 1500
*CONWAY	04 0520	MC GEHEE	04 1520
*CRAIGHEAD	04 0540	*MADISON	04 1540
*CRAWFORD	04 0560	MAGNOLIA	04 1560
*CRITTENDEN	04 0580	MALVERN	04 1580
*CROSS	04 0600	MARIANNA	04 1600
CROSSETT	04 0620	*MARION	04 1620
*DALLAS	04 0640	MARKED TREE	04 1640
DE QUEEN	04 0660	MENA	04 1660
DERMOTT	04 0680	*MILLER	04 1680
*DESHA	04 0700	*MISSISSIPPI	04 1700
DE WITT	04 0720	*MONROE	04 1720
*DREW	04 0740	MONTICELLO	04 1740
DUMAS	04 0760	*MONTGOMERY	04 1760
EL DORADO	04 0780	MORRILTON	04 1780
ENGLAND	04 0800	NASHVILLE	04 1800
EUDORA	04 0820	*NEVADA	04 1820
*FAULKNER	04 0840	NEWPORT	04 1840
FAYETTEVILLE	04 0860	*NEWTON	04 1860
FORDYCE	04 0880	NORTH LITTLE ROCK	04 1880
FORREST CITY	04 0900	*OUACHITA	04 1900
FORT SMITH	04 0920	OSCEOLA	04 1920
*FRANKLIN	04 0940	PARAGOULD	04 1940
*FULTON	04 0960	PARIS	04 1960
*GARLAND	04 0980	*PERRY	04 1980
*GRANT	04 1000	*PHILLIPS	04 2000

Figure 1. Typical sampling station identification codes (*denotes counties).

SEC-1001 (Cin)
(Rev. 11/66)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Robert A. Taft Sanitary Engineering Center

Budget Bureau No. 68-R937
Approval expires 4-30-71

AIR QUALITY DATA BANK
SITE LOCATION DESCRIPTIVE DATA

To Be Completed by Reporting Agency

Do Not Write Here

1

(1) (10-32) City Name (23 Characters)

(33-47) County Name (15 Characters)

(48-63) State Name (16 Characters)

64 65 66 67 68 69 70

(64-70) Population

Station Code
St Station Site
(2-9)

P T P
(71-74)

S M S A
(75-78)

Act
(80)

2

(1) (10-50) Sampling Site Address (41 Characters)

Sampling Site Address (Contd)

(51-58) Long. (7 Numbers) (59-65) Lat. (6 Numbers)

INDUSTRIAL, RESIDENTIAL, COMMERCIAL, SUBURBAN, NONURBAN

Type Station - Circle one or more of the above

(A)

Elevation of Sampler above ground in feet

(B)

Elevation of Sampler above mean sea level feet

Station Code
(2-9)

Longitude
D M S
(51-58)

Latitude
D M S
(59-65)

Type
(66-69)

Elev (A)
(70-73)

Elev (B)
(74-77)

Act
(80)

3

(1) (10-73) Supporting Agency (64 Characters)

Station Code
(2-9)

Act
(80)

Action (Col. 80)
1 - Add to Data File
2 - Change Only Recorded Data
3 - Delete

Necessary for nonurban stations
Desired for urban if readily available

Figure 2. Site location identification form.

SEC 555
(1-62)

SITE FILE LAYOUT - ITEM DESIGN

Title _____

Remarks n = decimal, a = alpha, 0 = decimal zeroes, b = alpha blank

Page 1 of 3 Modification _____

	12	11	10	9	8	7	6	5	4	3	2	1
1	State (n)		Area (n)				Site (n)		0	0	0	0
2	Pop. Code (n)	Top. Code (n)	Reg. Code (n)	SMSA Code (n)	SMSA (n)				0	0	0	0
3	b	Population (a)										
4	Station Name (a)											
5	Station Name (a)											
6	Station Name (a)											b
7	County Name (a)											
8	County Name (a)											b
9	State Name (a)											
10	State Name (a)											
11	Supporting Agency (a)											
12	Supporting Agency (a)											
13	Supporting Agency (a)											
14	Supporting Agency (a)											
15	Supporting Agency (a)											
16	Supporting Agency (a)											
	8	7	6	5	4	3	2	1				

Figure 3. Magnetic tape format of site identification.

SEC 555
(1-62)

SITE FILE LAYOUT - ITEM DESIGN

Title _____

Remarks n = decimal, a = alpha, 0 = decimal zeroes, b = alpha blank

Page 2 of 3 Modification _____

	12	11	10	9	8	7	6	5	4	3	2	1
17	Supporting Agency (a)											
18	Supporting Agency (a)											
19	Sampling Site Address (a)											
20	Sampling Site Address (a)											
21	Sampling Site Address (a)											
22	Sampling Site Address (a)											
23	Sampling Site Address (a)											
24	Site Address(a)		b		b		b		b		b		b		b		b	
25	Site Abbreviation (a)											
26	Site Abbreviation (a)											
27	Site Abbreviation (a)											
28	b	Latitude (a)										
29	b	Longitude (a)										
30	Elevation (a)								Height (a)			
31	SMSA Population (a)											
32	Station Type (a)								b	b	b	b
	8	7	6	5	4	3	2	1				

Figure 3 (continued). Magnetic tape format of site identification.

SEC 555
(1-62)

SITE FILE LAYOUT - ITEM DESIGN

Title _____

Remarks _____

Page 3 of 3 Modification _____

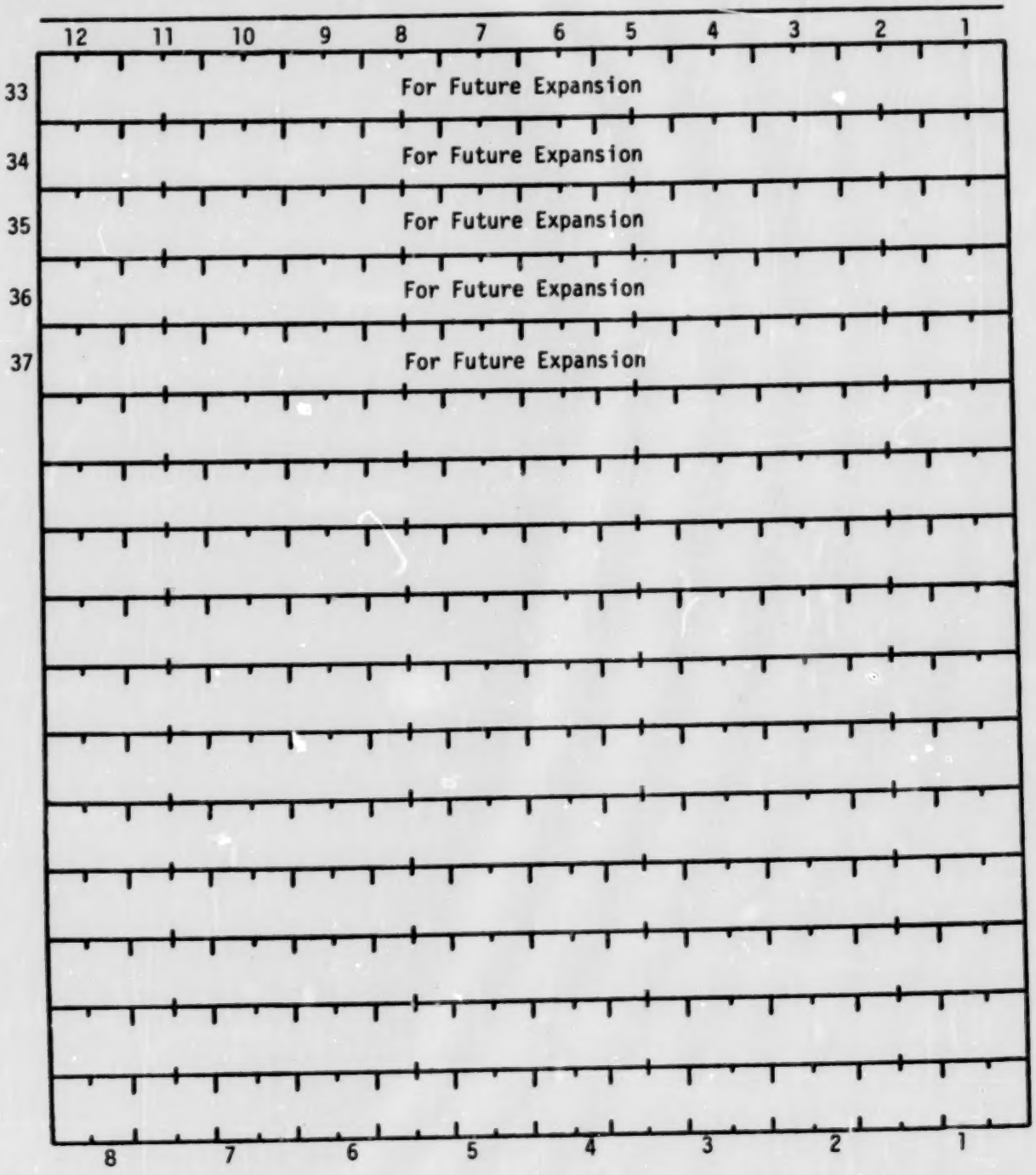
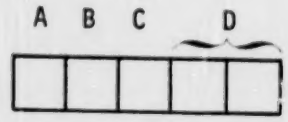

12 11 10 9 8 7 6 5 4 3 2 1
33 For Future Expansion
34 For Future Expansion
35 For Future Expansion
36 For Future Expansion
37 For Future Expansion
8 7 6 5 4 3 2 1

Figure 3 (continued). Magnetic tape format of site identification.

```
STATION-   CONNECTICUT     FAIRFIELD          BRIDGEPORT                  07 0060
SITE   -   = 01 POP CL 5     TOPO 0     PHS REG 1    TYPE     C
(CON'T)-   SMSA 0470      POP  156748 ELEV          55 FEET
(CON'T)-   LONG.      D      M      S     LAT.     D      M      S
ADDRESS-   274 MIDDLE STREET BRIDGEPORT, CONN.
AGENCY -   CONN. STATE DEPT. OF HEALTH

STATION-   CONNECTICUT     HARTFORD           NEW BRITAIN                 07 0680
SITE   -   = 01 POP CL 6     TOPO 0     PHS REG 1    TYPE     C
(CON'T)-   SMSA 2510      POP   82201 ELEV          25 FEET
(CON'T)-   LONG.      D      M      S     LAT.     D      M      S
ADDRESS-   MIDDLE ATLANTIC TRANSP. CO. 976 WEST MAIN
AGENCY -   CONN. STATE DEPT. OF HEALTH

STATION-   CONNECTICUT     NEW LONDON         NORWICH                     07 0840
SITE   -   = 01 POP CL 7     TOPO 0     PHS REG 1    TYPE     C
(CON'T)-   SMSA 2550      POP   38506 ELEV          65 FEET
(CON'T)-   LONG.      D      M      S     LAT.     D      M      S
ADDRESS-   CISCO BUILDING MAIN STREET
AGENCY -   CONN. STATE DEPT. OF HEALTH

STATION-   CONNECTICUT     FAIRFIELD          STAMFORD                    07 1080
SITE   -   = 01 POP CL 6     TOPO 0     PHS REG 1    TYPE     C
(CON'T)-   SMSA 3710      POP   92713 ELEV          50 FEET
(CON'T)-   LONG.      D      M      S     LAT.     D      M      S
ADDRESS-   FIRE STATION MAIN STREET
AGENCY -   CONN. STATE DEPT. OF HEALTH

STATION-   CONNECTICUT     NEW HAVEN          WATERBURY                   07 1240
SITE   -   = 01 POP CL 5     TOPO 0     PHS REG 1    TYPE     C
(CON'T)-   SMSA 4070      POP  107130 ELEV          55 FEET
(CON'T)-   LONG.      D      M      S     LAT.     D      M      S
ADDRESS-   CITY HALL WATERBURY, CONN.
AGENCY -   CONN. STATE DEPT. OF HEALTH

STATION-   GEORGIA         DOUGHERTY          ALBANY                      11 0040
SITE   -   = 01 POP CL 6     TOPO 0     PHS REG 4    TYPE     C
(CON'T)-   SMSA 0050      POP   64000 ELEV          12 FEET
(CON'T)-   LONG.      D      M      S     LAT.     D      M      S
ADDRESS-   306 FLINT ST.
AGENCY -   GEORGIA DEPT. OF PUBLIC HEALTH

STATION-   GEORGIA         RICHMOND           AUGUSTA                     11 0220
SITE   -   = 01 POP CL 6     TOPO 0     PHS REG 4    TYPE    RC
(CON'T)-   SMSA 0250      POP   47000 ELEV          18 FEET
(CON'T)-   LONG.      D      M      S     LAT.     D      M      S
ADDRESS-   RICHMOND CTY. HEALTH DEPT. 1001 BAILIE DR
AGENCY -   GEORGIA DEPT. OF PUBLIC HEALTH

STATION-   GEORGIA         GLYNN              BRUNSWICK                   11 0600
SITE   -   = 01 POP CL 8     TOPO 0     PHS REG 4    TYPE     C
(CON'T)-   SMSA           POP   21703 ELEV          4 FEET
(CON'T)-   LONG.      D      M      S     LAT.     D      M      S
ADDRESS-   GLYNN COUNTY HEALTH DEPT 501 MANSFIELD ST
AGENCY -   GEORGIA DEPT. OF PUBLIC HEALTH
```

Figure 4. Sample printout of site identification.

is identified by a five-digit code number. This code permits a family-tree-type subcategorization of pollutants. Such an arrangement provides for ease of retrieval by allowing the recall of data for a single pollutant or an entire class of pollutants with a single request card. For example, if the letters A, B, C and D represent the five digits designating a pollutant, the following distinction is possible:



A - denotes 1 of 9 major classes.
AB - denotes 1 of 81 subclasses.
ABC - denotes 1 of 729 families.
ABCD - denotes 1 of a possible 72,171 individual pollutants.

A pollutant catalog now being prepared assigns code numbers to all compounds that are known to exist in the ambient atmosphere. The overall system is capable of storing information for over 72,000 specific pollutants. Since fewer than half of the pollutants will be specified initially, ample room is provided for future expansion. An example of a pollutant family tree is presented in Figure 5.

The family-tree type of subcategorization presents a logical system of indexing the pollutant catalog. The index is composed of four phases, the first of which is an index for the nine major divisions of air contaminants shown in the top row of Figure 5.

The second phase codes the nine possible subclasses within a major class (row B, Figure 5). The third phase codes nine possible families within a subclass (row C, Figure 5). The forth phase provides the final two digits to complete the pollutant code. As an example, the individual pollutant codes assigned in the metals family of the inorganic subclass in the suspended particulate major class are listed in Table 1.

Complete codings for a number of the more common pollutants are listed in the appendix. Anyone wishing to report data on any pollutants not included here may obtain the appropriate code from the Air Quality and Emission Data Program, NCAPC.

SAMPLING AND ANALYTICAL METHOD IDENTIFICATIONS

For many specific pollutants, sampling methods and analytical procedures for determining atmospheric concentrations have not been standardized. As a result, it is generally not sufficient merely to cite the measured concentration of

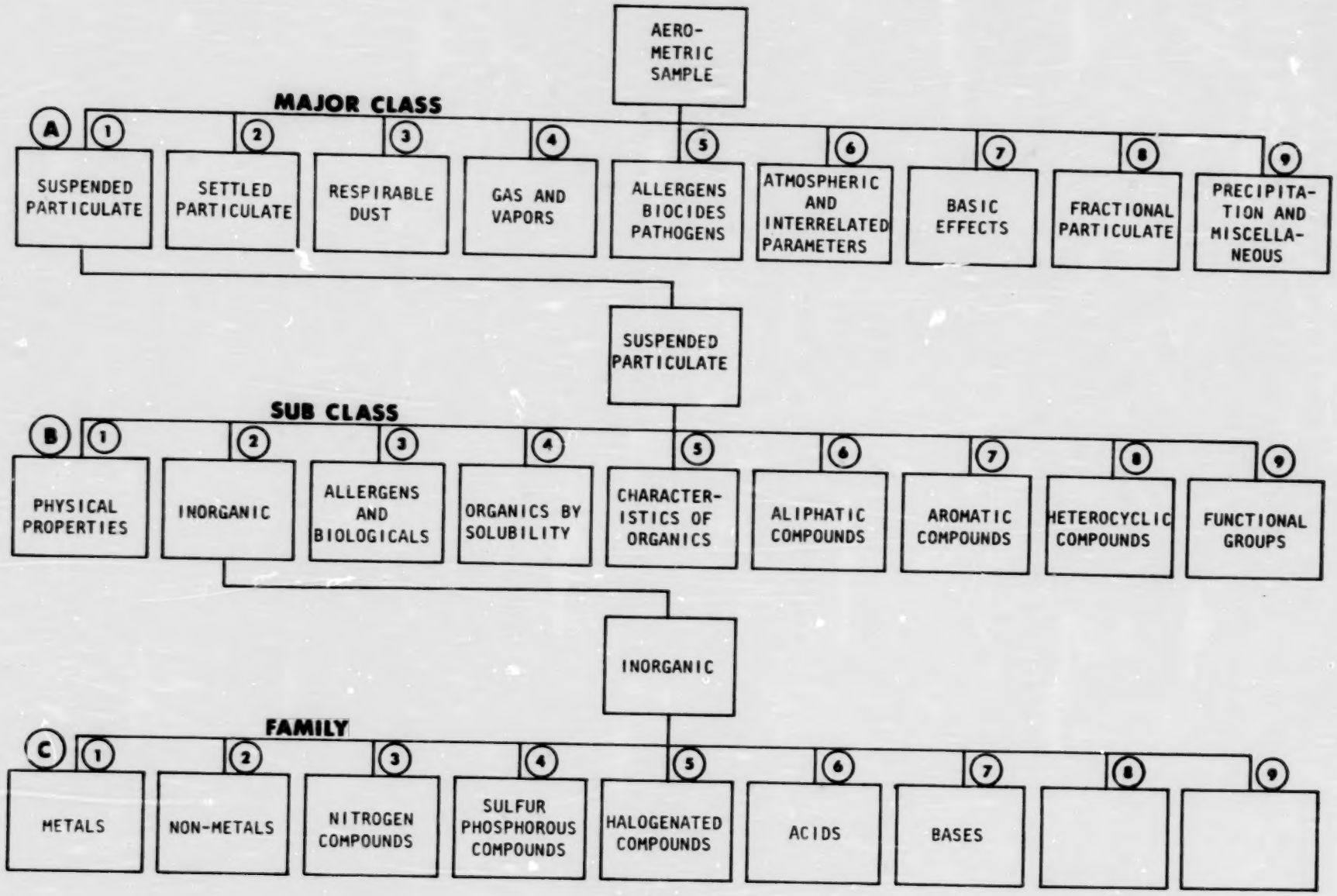


Figure 5. Breakdown of pollutants by major class, sub class, and family.

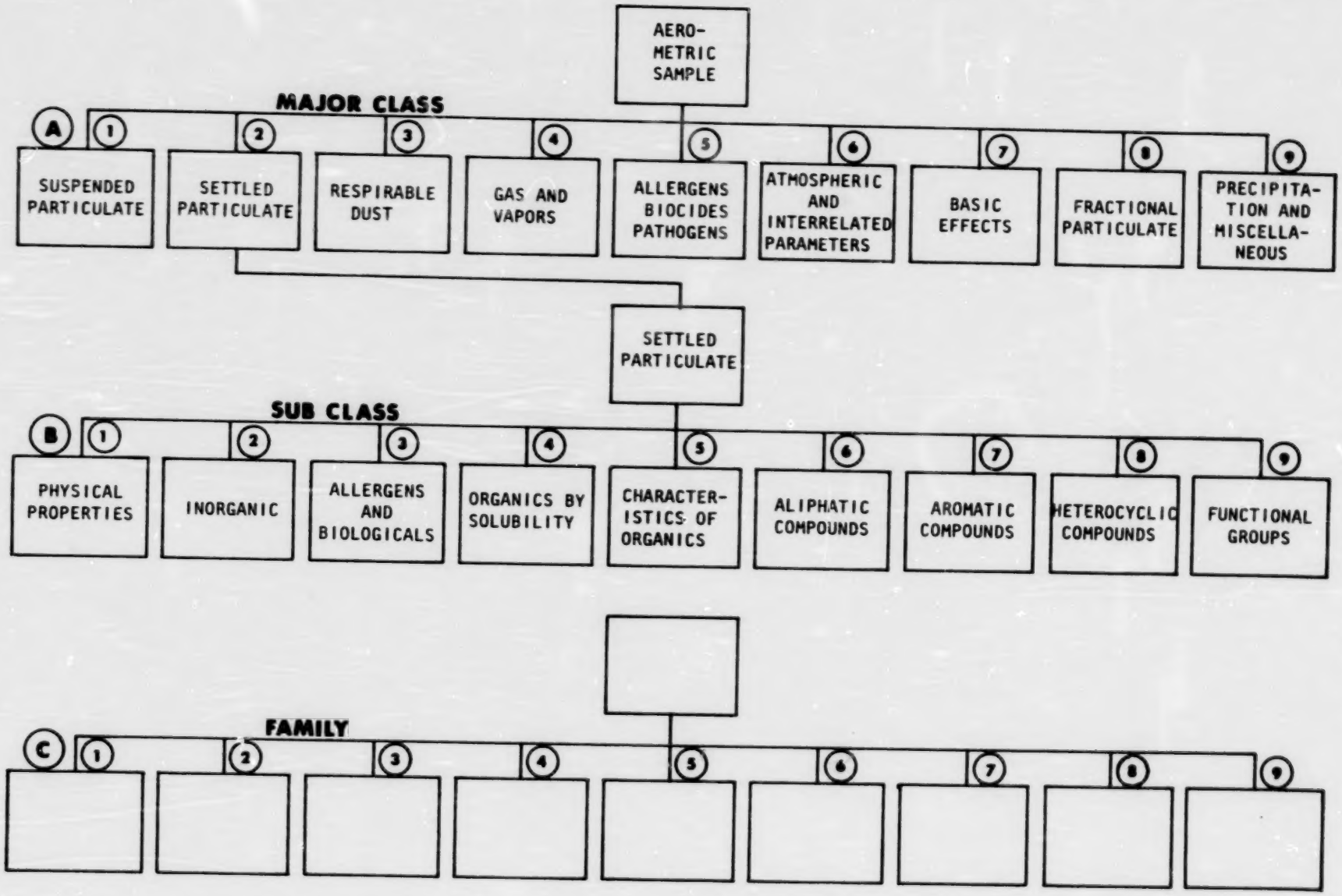


Figure 5 (continued). Breakdown of pollutants by major class, sub class, and family.

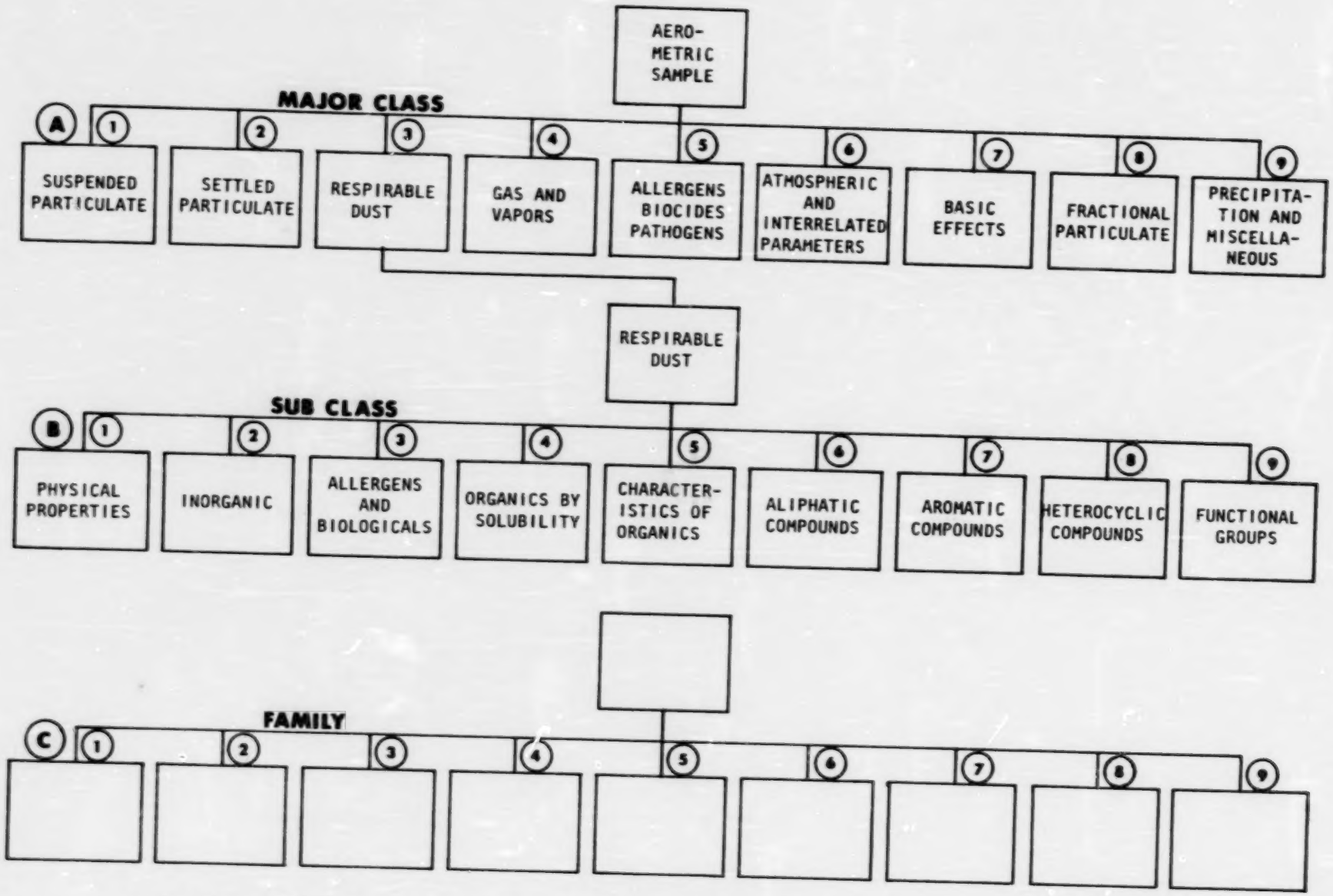


Figure 5 (continued). Breakdown of pollutants by major class, sub class, and family.

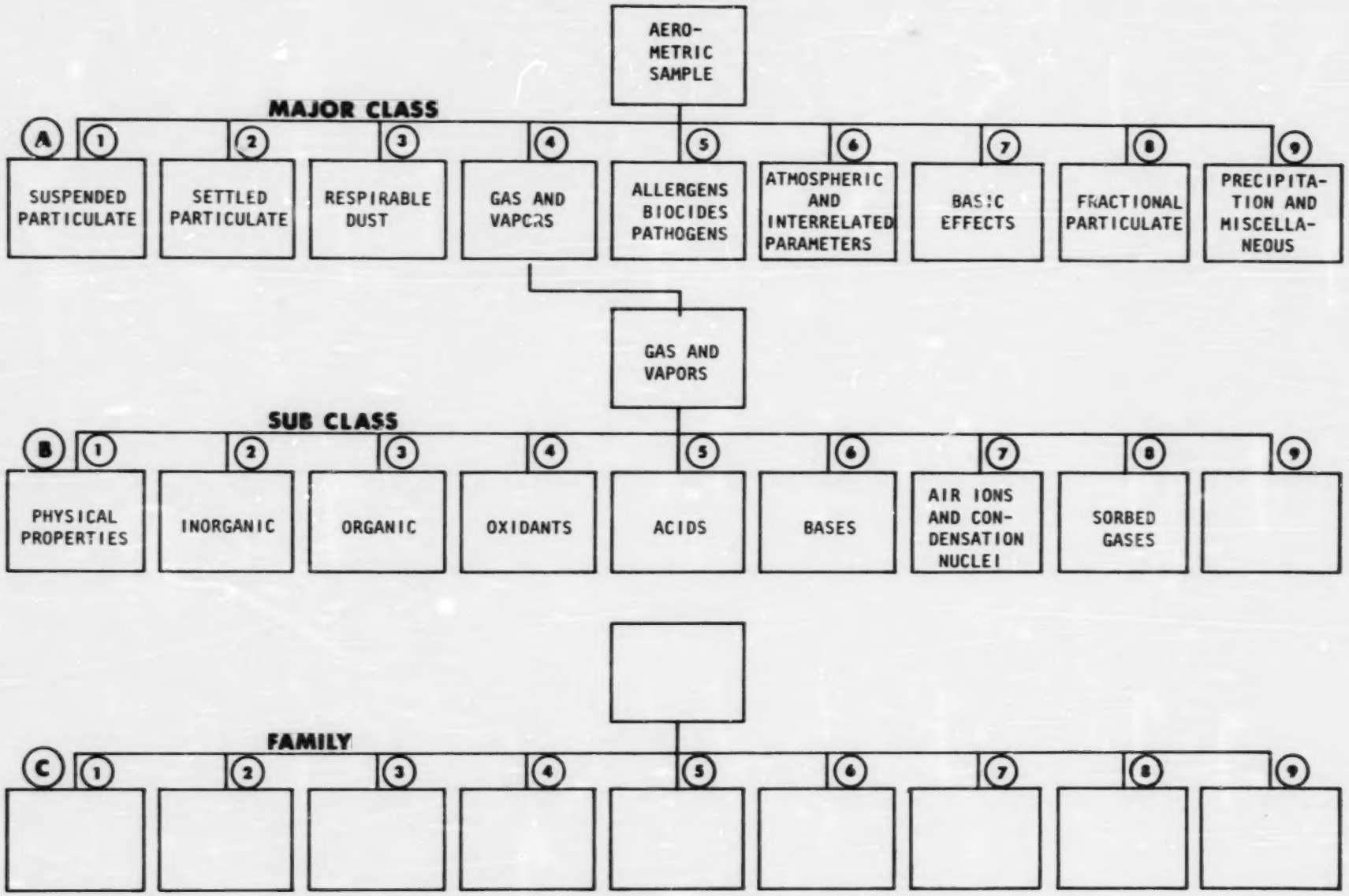


Figure 5 (continued). Breakdown of pollutants by major class, sub class, and family.

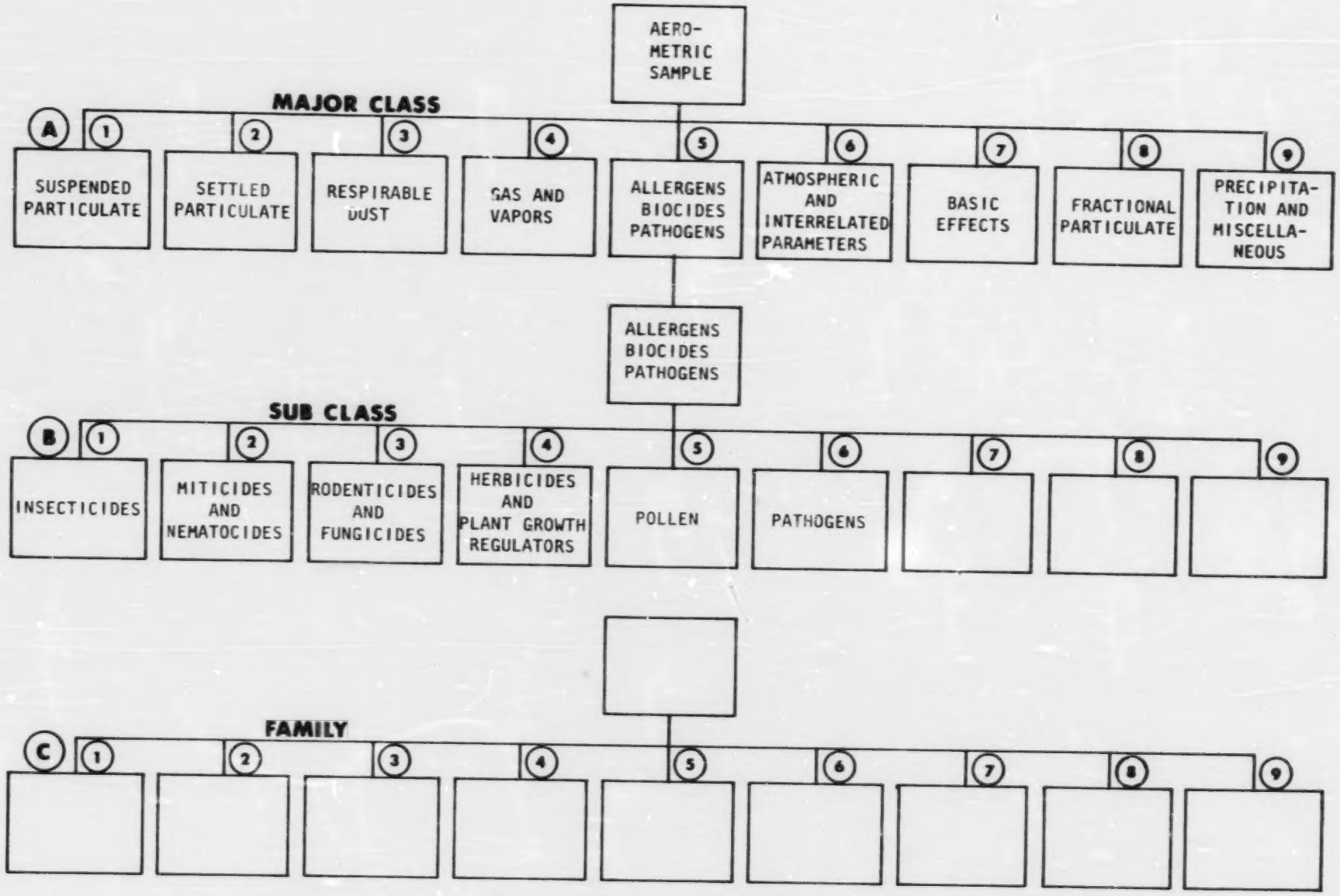
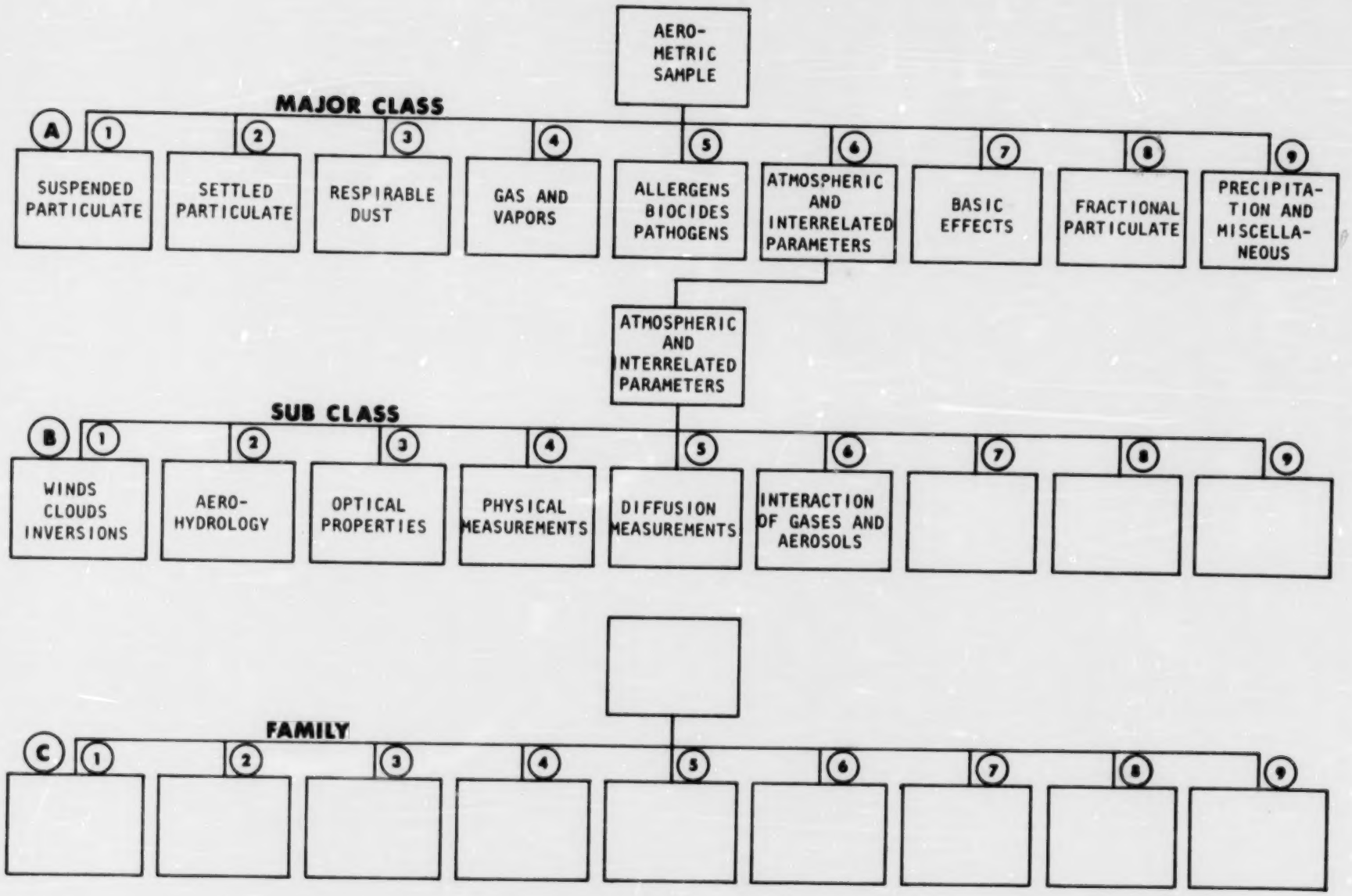


Figure 5 (continued). Breakdown of pollutants by major class, sub class, and family.



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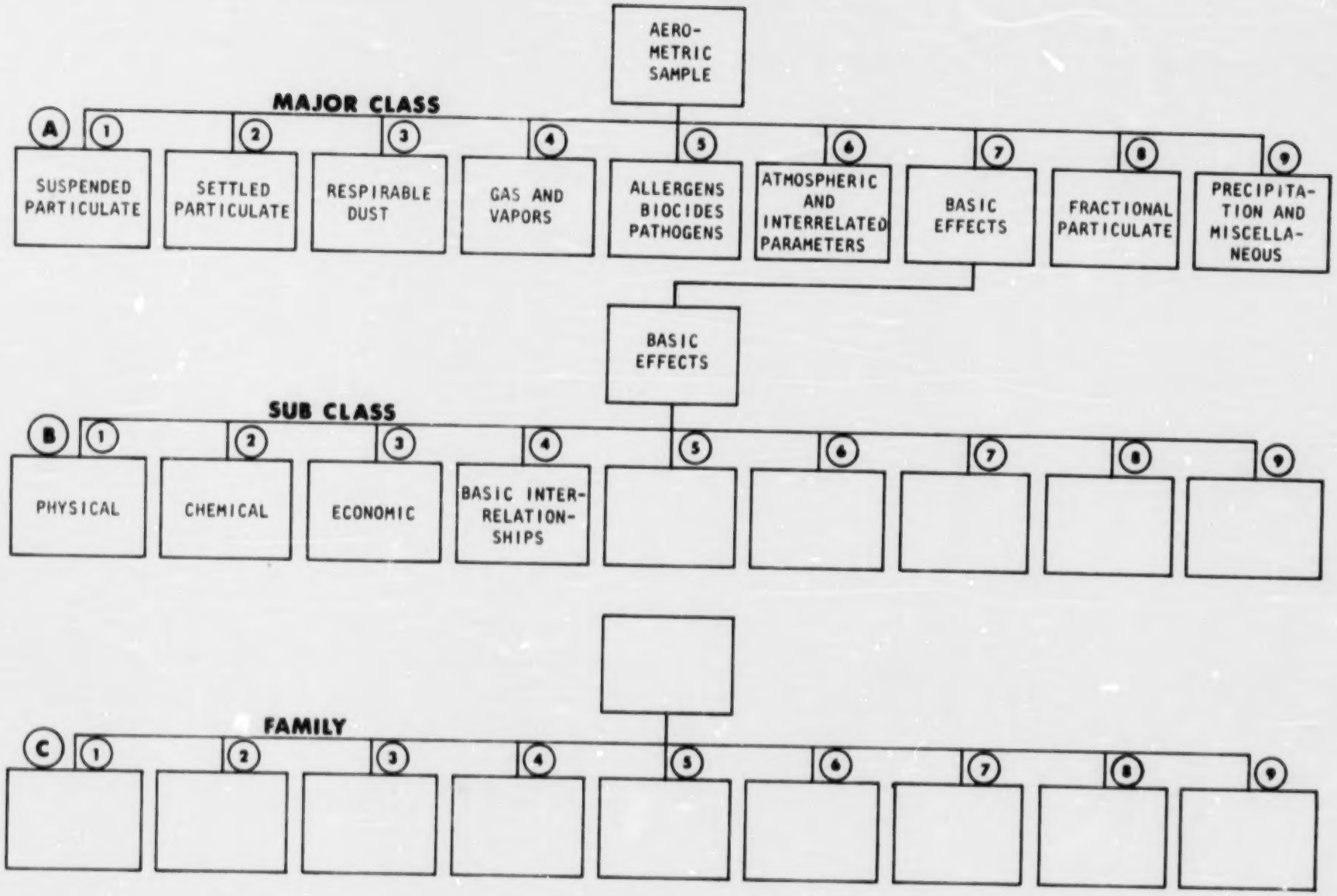

Figure 5 (continued). Breakdown of pollutants by major class, sub class, and family.

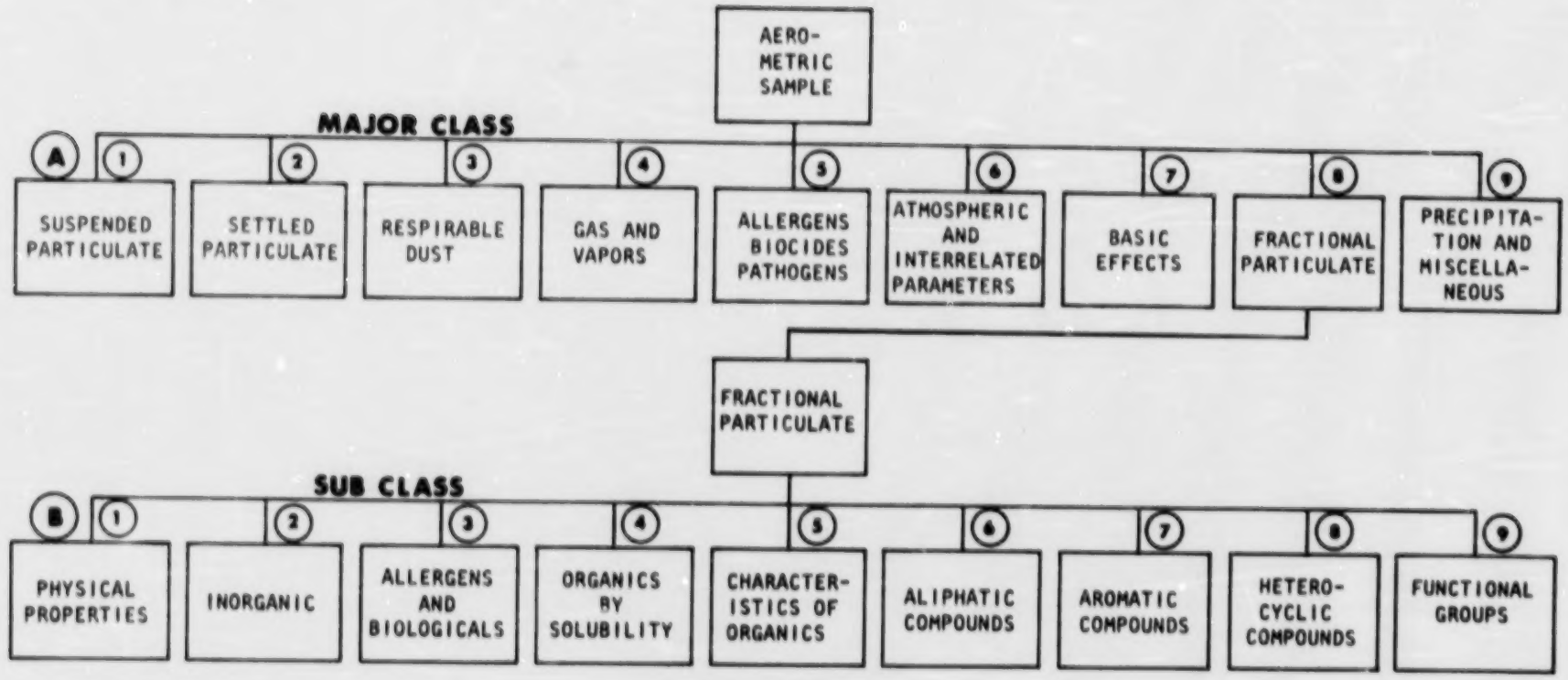

Figure 5 (continued). Breakdown of pollutants by major class, sub class, and family.

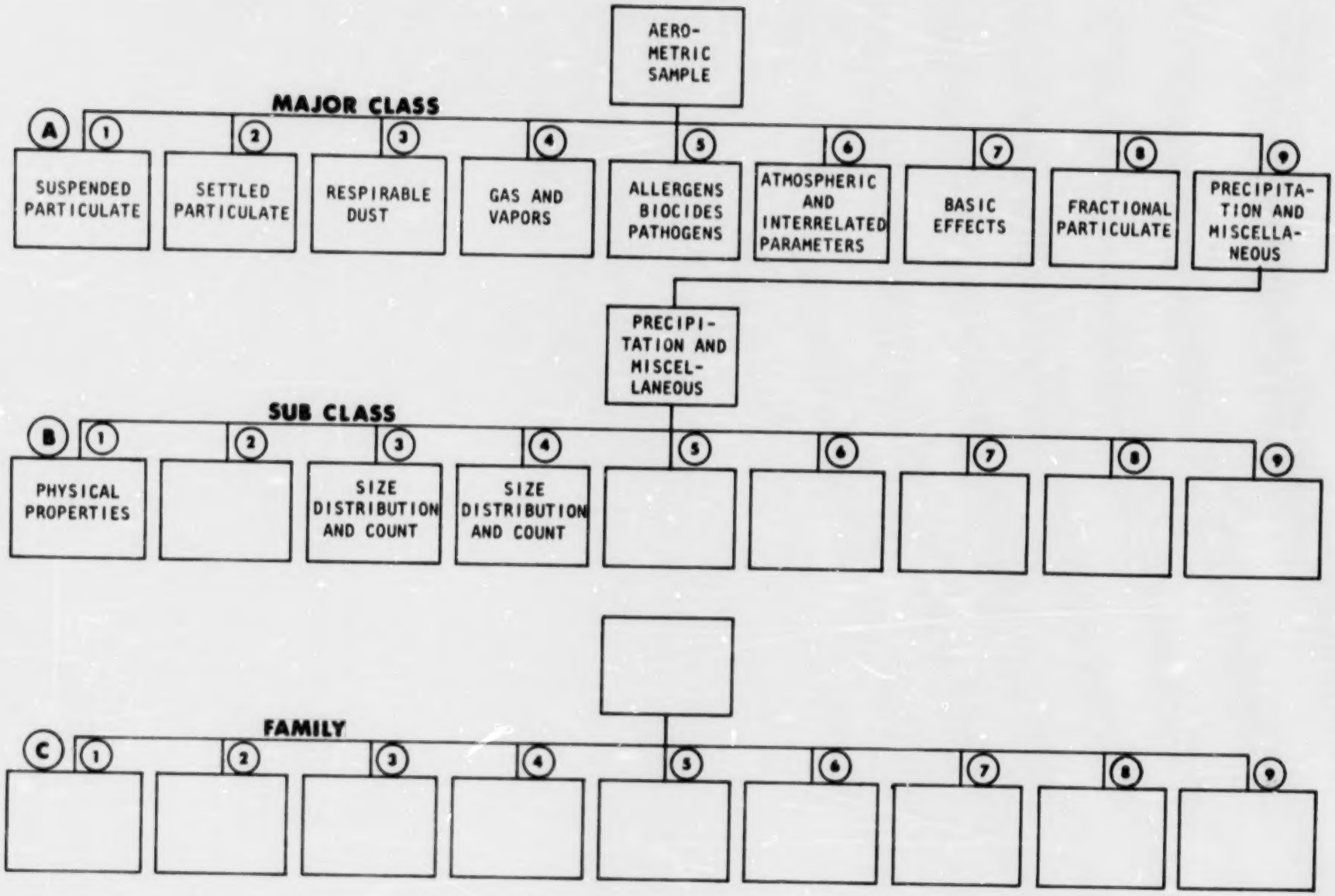

Figure 5 (continued). Breakdown of pollutants by major class, sub class, and family.

Table 1. EXAMPLE OF CODES BY CLASS AND FAMILY. MAJOR CLASS, SUSPENDED PARTICULATE; SUB CLASS, INORGANIC; FAMILY, METALS[a].

Name	Symbol	Code
Aluminum	Al	12101
Antimony	Sb	12102
Arsenic	As	12103
Barium	Ba	12104
Beryllium	Be	12105
Bismuth	Bi	12106
Boron	B	12107
Cadmium	Cd	12108
Calcium	Ca	12109
Cerium	Ce	12110
Cesium	Cs	12111
Chromium	Cr	12112
Cobalt	Co	12113
Copper	Cu	12114
Dysprosium	Dy	12115
Erbium	Er	12116
Europium	Eu	12117
Gadolinium	Gd	12118
Gallium	Ga	12119
Germanium	Ge	12120
Gold	Au	12121
Hafnium	Hf	12122
Holmium	Ho	12123
Indium	In	12124
Iridium	Ir	12125
Iron	Fe	12126
Lanthanum	La	12127
Lead	Pb	12128
Lithium	Li	12129
Lutetium	Lu	12130
Magnesium	Mg	12131
Manganese	Mn	12132
Mercury	Hg	12133
Molybdenum	Mo	12134
Neodymium	Nd	12135
Nickel	Ni	12136
Niobium	Nb	12137
Osmium	Os	12138
Palladium	Pd	12139
Platinum	Pt	12140
Potassium	K	12141
Praseodymium	Pr	12142
Protactinium	Pa	12143
Radium	Ra	12144
Rhenium	Re	12145
Rhodium	Rh	12146
Rubidium	Rb	12147
Ruthenium	Ru	12148
Samarium	Sm,Sa	12149
Scandium	Sc	12150
Silver	Ag	12151
Sodium	Na	12152
Strontium	Sr	12153

Table 1 (continued). EXAMPLE OF CODES BY CLASS AND FAMILY. MAJOR CLASS, SUSPENDED PARTICULATE; SUB CLASS, INORGANIC; FAMILY, METALS[a]

Tantalum	Ta	12154
Tellurium	Te	12155
Terbium	Tb	12156
Thallium	Tl	12157
Thorium	Th	12158
Thulium	Tm	12159
Tin	Sn	12160
Titanium	Ti	12161
Tungsten	W	12162
Uranium	U	12163
Vanadium	V	12164
Ytterbium	Yb	12165
Yttrium	Y	12166
Zinc	Zn	12167
Zirconium	Zi	12168

[a]Unit of concentration is $\mu g/m^3$

a pollutant. It is essential to provide an indication of the sampling methods and analytical procedures used to permit valid comparison of results.

The SAROAD system utilizes a two-digit identification for the method of determination for each individual pollutant. The first digit designates thesampling method, and the second, the analytical method. Such a system thus provides for nine sampling and nine analytical methods for each pollutant. Codes for the more common collection and analytical methods are included with the pollutant codes in the appendix.

REPORTING DATA

Any of three methods may be used in submitting data for inclusion in the SAROAD data file: (1) data record forms, (2) punched cards, and (3) magnetic tape. Data record forms are appropriate when a limited amount of data is to be submitted or the contributing agency has not yet incorporated automatic data processing procedures. In many cases, it is anticipated that the contributing agencies will acquire facilities for key punching data for their own use and can easily submit their data on cards punched in the SAROAD format. The punched-card method is preferred because of the volume of data from diverse sources to be received as input to the SAROAD system. The only magnetic tape format considered acceptable at present is that generated by the Honeywell 400 computer. It is doubtful that many participants will have immediate access to such a computer.

DATA RECORD FORMS

Because of the diversity in air sampling methods, several standard reporting forms have been designed, and considerable flexibility exists for recording a wide variety of air quality data. It is hoped that local agencies will be able to select a form, or forms, that will be suited to their own needs and will, at the same time, eliminate laborious transcribing in order to submit data to the national data storage file. Indeed, when a local agency that uses record forms carries its data handling to the next logical step, that is, generating punched cards for its own immediate data analysis and interpretation, the data can be submitted by simply duplicating the deck of punched cards.

The provisions for coding sampling methods and analytical techniques have already been described. Diversities in coding sampling interval and classifications of source are shown in Table 2.

The record forms are described in the following order:

Figure 6: FORM 4. One day's record for a site where only a single pollu-

Table 2. CODES FOR IDENTIFICATION OF SAMPLES

Time interval	
1.	1-hour data
2.	2-hour data
3.	4-hour data
4.	6-hour data
5.	8-hour data
6.	12-hour data
7.	24-hour data
8.	Monthly data
9.	Quarterly data
Classification (Class)	
1.	Routine scheduled
2.	Nonroutine or extra
3.	Weather Bureau Air Pollution Alert
4-9.	(Future expansion)
Card number (CD)	
(Used only when reporting hourly data)	
1.	Designates a.m. sampling
2.	Designates p.m. sampling
Category of contributing agency (Source)	
01.	National Air Surveillance Networks
02.	City network
03.	District network
04.	State network
05.	CAMP
06.	
07.	Economic Effects Research Program
08.	Health Effects Research Program
09.	Abatement Program
10.	Private agency
11.	
12.	U.S. Weather Bureau
13-99.	(Future expansion)

tant is measured over time intervals of 1, 2, 4, 6, 8, or 12 hours. (5- by 7-inch card)

Figure 7: FORM 5. Measurements on as many as 40 different pollutants or sample fractions taken at a single site, collected over a common time interval of 24 hours or more. (5- by 7-inch card)

Figure 8: FORM 6. Monthly record, measurements on as many as five different pollutants, or sample fractions taken at a single site, collected over a common time interval of 24 hours or more. (8-1/2- by 11-inch sheet)

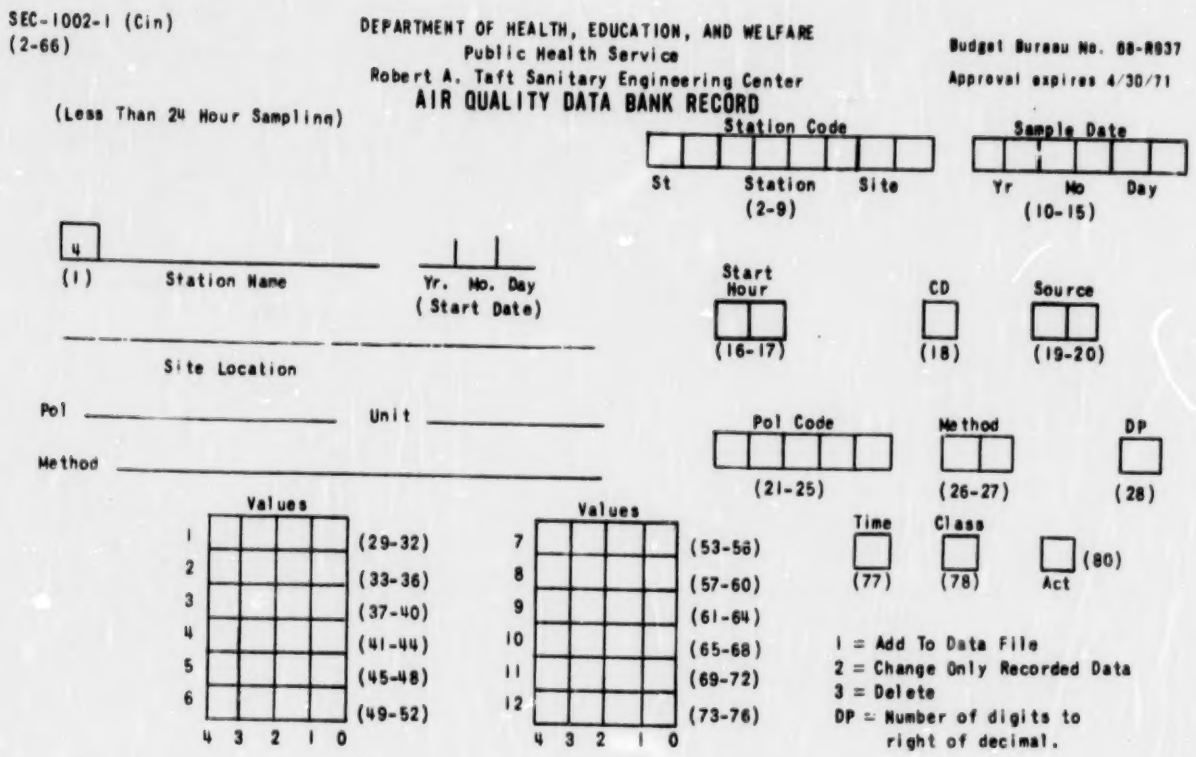

Figure 6. Data record form for single pollutant measured at single site during intervals of less than 24 hours.

Figure 9: FORM 7. One day's record for a site where as many as four different pollutants or sample fractions are measured over a common time interval of 1, 2, 4, 6, 8, or 12 hours. (8-1/2- by 11-inch sheet)

Figure 10: FORM 8. Monthly record of consecutive measurements of one pollutant over an interval of 1, 2, 4, 6, 8, or 12 hours. (8-1/2- by 11-inch sheet)

The identifying form number is found in the first card column position of each form. Measurement values can be recorded to four significant digits with the decimal point location designated according to the number of digits to the right of the decimal (from zero through 4*). No provision is made for storing

*The SAROAD system can accommodate data requiring more than four places to the right of the decimal point. Contact NCAPC for details.

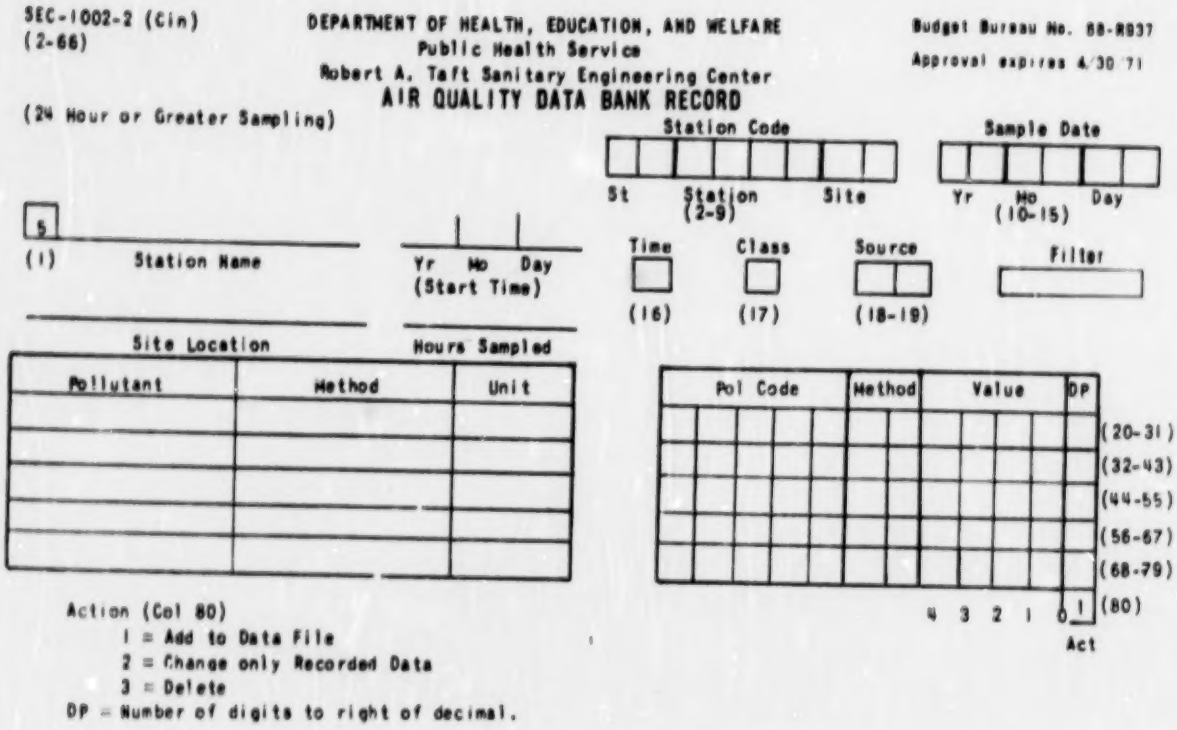

Figure 7. Data record form for multiple pollutants measured at a single site during common time intervals of 24 hours or more.

raw data on measurements over sampling intervals of less than 1 hour. Short interval measurements such as the 5-minute Continuous Air Monitoring Program (CAMP) data can be reduced to hourly averages and stored in that form. If the stored data are derived from more detailed measurements, a footnote on the retrieval output will indicate its nature and where it may be obtained.

Form 4 (Figure 6) is intended for recording consecutive measurements on one pollutant over intervals of 1, 2, 4, 6, 8, or 12 hours during 1 day when the sampling dates are irregular and/or infrequent. For example, twelve 2-hour Coh unit readings (pollutant code 11201, method code 91) for a day can be put on Form 4. If 1-hour readings of a pollutant are put on this form, two cards will be needed; one for measurements taken during a.m. hours and identified by a 1 in card-column position 18 (CD), and the other for the p.m. readings and identified by a 2 in position 18. Position 18 is left blank when sampling intervals longer than 1 hour are used. Pollutant values are entered consecutively, starting with position 29. If, for example, a series of 4-hour readings are taken beginning at 6 a.m., the first reading is entered in Item 1 (positions 29-32) and the start hour, 06, is designated in positions 16 and 17. The time interval code, in this case a 3,

SEC-1002-4 (Cin)
(2-66)

(24 Hour or Greater Sampling)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Robert A. Taft Sanitary Engineering Center

AIR QUALITY DATA BANK
MONTHLY RECORD

Budget Bureau No. 68-R037
Approval expires 6/30/71

6 (1) Station Name — Year Month

Site Location

STATION CODE: St | Station (2-9) | Site — CODE: Year Month (10-13)

Time (14) | Class (15) | Source (16-17)

Note: M Designates Sampling and Analytical Method
DP = Number of Digits to Right of Decimal

Day (58 59)	(Name) Pollutant (Code) (18-22) M DP (43-45) (60 61 62 63)	(Name) Pollutant (Code) (23-27) M DP (46-48) (64 65 66 67)	(Name) Pollutant (Code) (28-32) M DP (49-51) (68 69 70 71)	(Name) Pollutant (Code) (33-37) M DP (52-54) (72 73 74 75)	(Name) Pollutant (Code) (38-42) M DP (55-57) (76 77 78 79)
01					
02					
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	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0

80 Act

Figure 8. Monthly data record form for up to five pollutants measured at a single site during common time intervals of 24 hours or more.

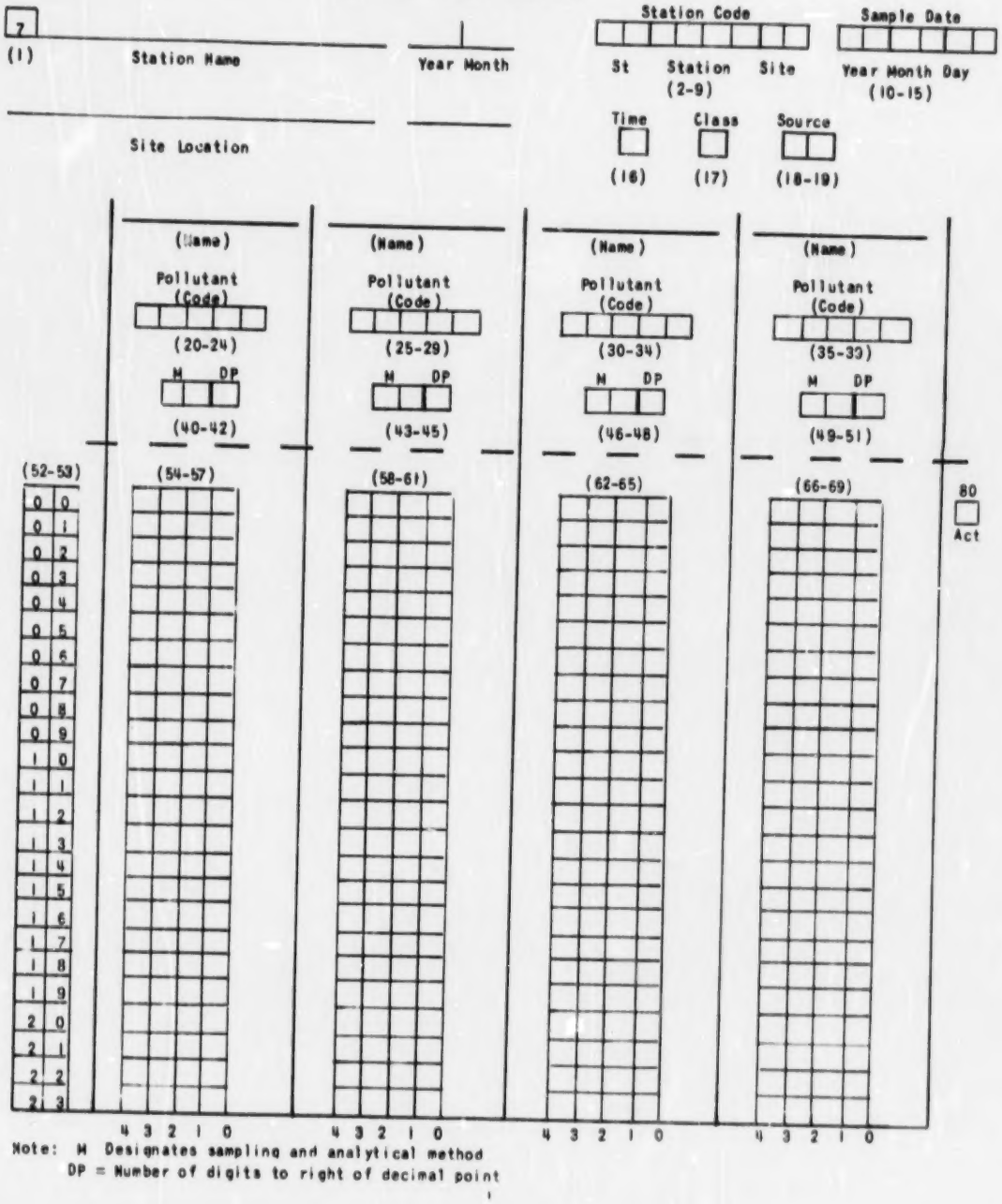
SEC-1002-3 (Cin)
(2-66)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Robert A. Taft Sanitary Engineering Center

Budget Bureau No. 68-R037
Approval expires 4/30/71

AIR QUALITY DATA BANK DAILY RECORD

(Less Than 24 Hour Sampling)



Note: M Designates sampling and analytical method
DP = Number of digits to right of decimal point

Figure 9. Data record form for one day's measurement of up to four pollutants during common time intervals of up to 12 hours.

SEC-1002-5 (Cin)
(2-66)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Robert A. Taft Sanitary Engineering Center

Budget Bureau No. 68-R931
Approval expires 4 30 71

AIR QUALITY DATA BANK
MONTHLY RECORD

(Less Than 24 Hour Sampling)

8 (1) Station Name

Site Location

Station Code: St (2-9) Station Site

Date: Yr Month (10-13)

Time* (14) Class (15) Source (16-17)

Pollutant Name

Pol Code (18-22)

Method (23-24) DP (25)

* Location on card specifies starting time

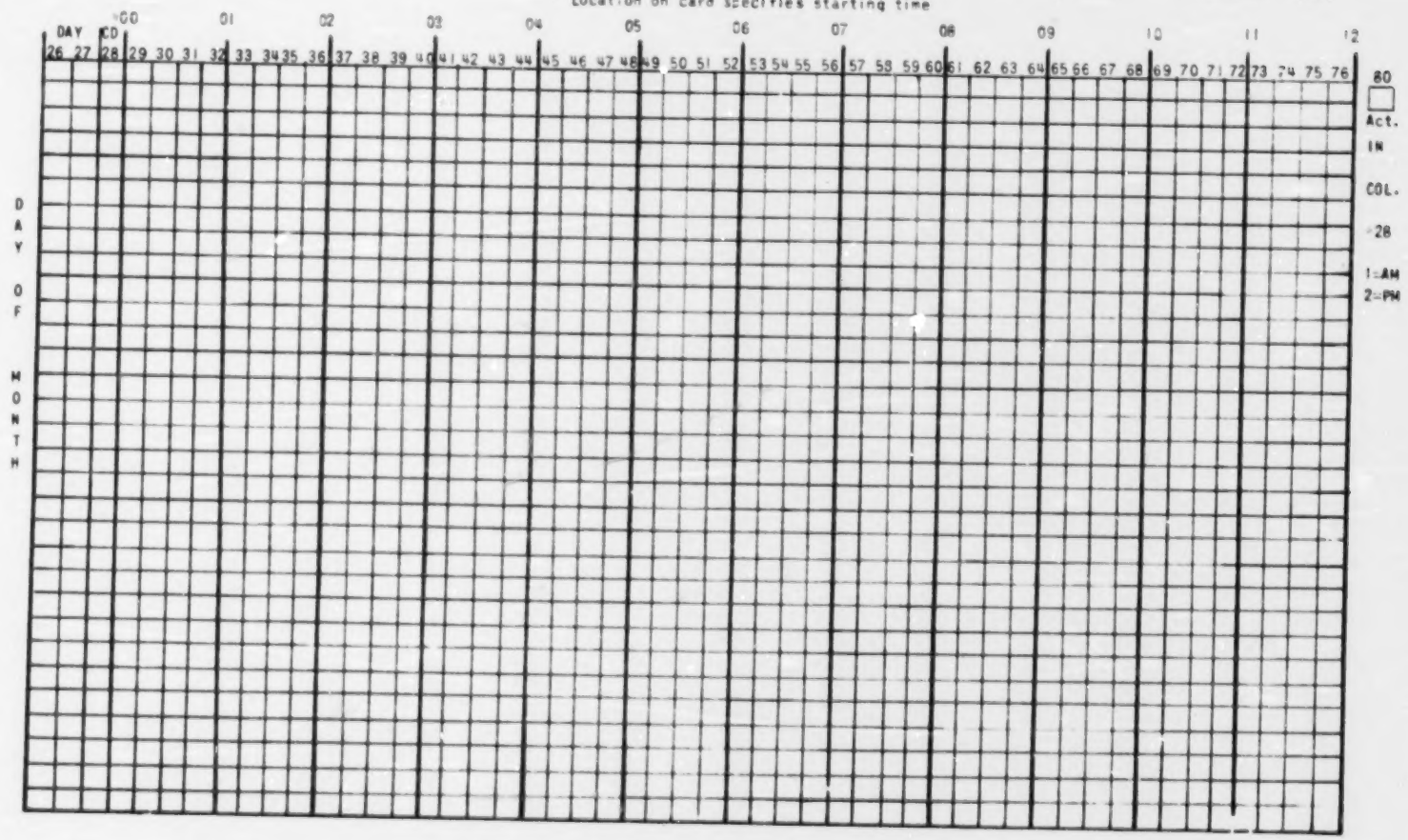


Figure 10. Monthly record of consecutive measurements of one pollutant during intervals of up to 12 hours.

which represents the 4-hour sampling interval (see Table 2), is placed in position 77. The next reading, for the 10 a.m. to 2 p.m. period, goes in Item 2, etc. If the value has fewer than four significant digits, the digits must be entered in the positions farthest right and the remainder of the item filled with zeros. If a reading is missed or invalidated, the entire field is left blank. Thus, if the reading for the 2 p.m. to 6 p.m. interval is missed, 9's are entered in the third item (positions 37-40). The fifth value is for the period 10 p.m. to 2 a.m. the next day (positions 45-48) because each value is associated with the hour in which the measurement begins. Succeeding values for the next day are recorded on a new card, and the start hour is designated as 02.

Form 5 is a record card for recording measurements taken over an interval of 24 hours or longer. As many as 40 pollutants and/or fractions thereof can be recorded on a single card, provided they are measured at one site simultaneously. Thus, sulfation rate by lead candle and dustfall measurements at a given site for the same monthly interval may be reported on the same card. Similarly, analyses of 24-hour high-volume air samples and 24-hour liquid-impinger measurements of gaseous pollutants at the same site for the same 24-hour period can be reported on a single card.

The laboratory of the Air Quality and Emission Data Program records data from the NASN "hi-vol" network on Form 5. The suspended particulates and constituent fractions data virtually fill one card; therefore, data on gaseous pollutants are recorded on a separate card.

Form 6 provides space for a month's record of five pollutants and/or fractions collected at one site over a common time interval of 24 hours or more. Samples collected for more than 24 hours are identified with the date sampling began.

Form 7 provides space for a day's record of up to four pollutants and/or fractions collected at one site over a common time interval of one hour or longer, but less than 24 hours. Positions 52 and 53 identify the 24 hours of the day. If a sample is collected over an interval of 2, 4, etc., hours, the sample should be identified with the hour in which sampling begins.

Form 8 provides space for recording values for one pollutant over an interval of 1, 2, 4, 6, 8, or 12 hours. If 1-hour values are being recorded, two lines are required. The a.m. values on one line are identified by the numeral 1 in

position 28. The p.m. values on the following line are identified by numeral 2 in position 28. If the sampling interval is 2 hours or more, 1 day's data will fit a single line and position 28 is left blank. Each interval, 1 through 12, is associated with a specific hour or group of hours in the day, depending on the time interval (position 14) specified. The time associated with each interval should be written at the top of each 4-digit data field. For example, a 4-hour time interval (code 3) assigns the hours midnight to 4 a.m. to the first interval (positions 29, 30, 31, and 32), 4 a.m. to 8 a.m. to the second interval, etc., through the sixth interval. The remaining intervals are left blank. If, on a certain date, only one 4-hour sample is taken and sampling is initiated any time between 4 p.m. and 8 p.m., the value is entered in interval 5 and the other intervals are left blank.

PUNCHED CARDS

When participants in the SAROAD system of data reporting adopt automatic data processing methods and begin to process their record forms into punched cards, the data can be submitted to SAROAD in the form of a duplicate deck of the data cards.

To accommodate agencies that have established automatic data processing systems with special requirements or limitations necessitating a non-SAROAD format, specialized input routines will be written as the need arises.

MAGNETIC TAPE

Submission of data already on magnetic tape will require special arrangements, since some special computer programming will be needed unless the SAROAD system magnetic tape format has been adopted.

Magnetic Tape Data Format

A data item in the SAROAD magnetic tape file consists of all data obtained by an agency at a single station for samples collected over a common sampling period or interval on a particular date. A new item is constructed when time interval or source is changed.

A data record consists of all data pertaining to one station for all time intervals and from all sources. A new record is constructed when date or station is changed.

To conserve magnetic tape space, variable length items and records are used.

RETRIEVAL OF DATA

The principal purpose of the national data storage file is to assemble information from as many sources as possible and thereby broaden the base for investigating relationships between air pollution and health effects, meteorology, economic losses, etc. A system of retrieval programs that can scan the data file tape and pick out all data on a certain pollutant or pollutants for specified periods, geographic locations, and/or categories of sites is essential.

Retrieval programs, which have been anticipated to be the most frequently requested, are listed below. Examples of the computer output are shown in the corresponding figures.

Hourly Averages (Figure 11) - This example shows a full month's listing of hourly averages for a pollutant, with daily averages shown at the right and hourly averages across the bottom. The bottom line of averages is the diurnal pattern for the period summarized, which, in this case, is 1 month. In similar manner, diurnal patterns for seasons, Sundays in contrast to weekdays, etc. can be obtained.

Frequency Distribution, Annual (Figure 12) - The nine columns marked "Frequency Distribution" in this tabulation list the frequency of occurrence of values equal to or less than the concentration shown under a given percentile. For example, the first line shows that calculations based on 25 samples of suspended particulate matter collected in the year 1957 in Birmingham, Alabama, indicate that the daily average concentration of suspended particulates was 166 $\mu g/m^3$ or less 70 percent of the time. Conversely, concentrations could be expected to exceed 166 $\mu g/m^3$ 30 percent of the time. Columns to the left and right of the decile columns show the minimum and maximum individual sample concentrations. To the right, the arithmetic mean, geometric mean, and standard geometric deviation are listed. These geometric parameters are appropriately

CONTINUOUS AIR MONITORING PROGRAM

Air Quality Section, Laboratory of Engineering and Physical Sciences
Division of Air Pollution, Public Health Service
U. S. Department of Health, Education, and Welfare

Robert A. Taft Sanitary Engineering Center
Cincinnati, Ohio 45226

HOURLY AVERAGES OF GASEOUS POLLUTANT CONCENTRATIONS

CONCENTRATION IN PPM

FLAME IONIZATION ANALYSIS

PHILADELPHIA, PA.

TOTAL HYDROCARBON
MAY 1966

DAY OF MONTH	AM 12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	PM 12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	DAILY MEAN	NO OF HRS
1*	2.5	2.6	3.1	2.9	2.6	2.5	2.3	2.2	2.1	2.0	2.0	2.0	1.8	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	2.11	24
2	1.6	1.6	2.0	2.0	1.9	1.5	1.5	1.6	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.7	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.71	24
3	2.0	2.4	2.3	2.2	2.5	3.0	3.7	4.0	3.3	2.5	2.2	2.0			2.0	2.0	2.0	2.0	2.1			2.1	1.9	1.6	2.37	20
4	1.6	1.5	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6						1.7	1.6	1.7	1.7	1.7	1.7	1.59	19
5	1.8	2.5	2.8	2.8	3.1	3.1	2.7	2.3	2.4	2.4						2.1	2.0	2.0		2.1	2.1	2.1	2.6	2.7	2.41	18
6	2.7		5.1	3.4	2.3	2.3	2.3	2.6	2.6	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.1	1.9	1.8		1.7	1.7	1.7	1.7	2.16	22
7*	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.7	1.64	24
8*	1.7	1.7				1.7	1.7	1.9	1.9	1.9		2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.1	2.1	2.1	2.1		2.09	19
9		2.0					2.0	2.1	2.3	2.3	2.3	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.8	1.7	1.6	1.6	1.98	19
10	1.6	1.6	2.9	2.9	1.9	1.8	1.7	1.7	2.9	7.7	3.2	2.2	2.1	2.0	2.0			2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.41	22
11	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.1	2.12	24
12	2.1	2.1	3.2	2.9	2.2	2.2	2.3	2.6	2.5	4.0	9.7	11.6	11.4	4.7	2.3	2.1	2.3	4.3	2.5	2.2	2.1	2.0	2.0	2.0	3.55	24
13	2.2	2.6	3.6	4.0	3.3	3.0	2.9	3.0	2.9	2.3	2.2	2.1		1.9	2.4	7.0	3.6	2.1	1.9	1.9	1.9	2.0	2.0	1.9	2.72	23
14*	1.9	1.9	3.9	3.2	2.0	1.9	2.2	2.4	2.4	2.2	2.1	5.8	3.5	2.2	2.0	2.0	2.1	2.0	2.0	1.9	1.9	2.0	2.2	2.2	2.40	24
15*	2.0	2.1	2.4	2.8	2.3	3.1	2.8	2.5	2.4	2.1	8.3	8.0	2.5	2.0	2.0	2.0	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.65	24
16	1.7	1.6	1.8	2.2	2.8	3.2	2.7	2.4	2.5	2.2	2.0	1.9	1.9	1.9	2.6	2.4	2.7	2.5	1.9	1.7	1.7	1.8	1.8	2.0	2.15	24
17	1.9	1.7	1.7	1.7	1.7	1.7	1.9	2.3	2.3	2.4	2.4	2.4	2.3	2.5	2.7	2.5	2.8	2.6	2.7	2.4	2.0	1.9	1.9	1.8	2.15	24
18	1.7	2.3	1.8	1.8	1.7	1.9	2.0	2.5	2.8		3.0	3.0	2.9	3.1	3.3	3.5	3.9	3.4	3.1	2.8	2.6	2.8	2.8	2.7	2.65	23
19	2.4	2.6	2.7	2.3	2.3	2.4	2.6	3.1	2.9	2.6	2.6	2.8	3.4		3.0	3.3	3.2	3.3	3.3	4.3	5.2	4.5	4.1	4.2	3.17	23
20	4.4	5.5	4.8	3.9	3.2	3.2	4.6	4.1	4.3	3.3	3.8	4.2	2.6	2.1	2.3	2.1	2.1	2.0	1.9	2.4	3.3	3.6	4.3	3.5	3.38	24
21*	3.6	3.8	4.4	5.9	4.6	6.4	6.1	4.8	3.3	2.9	2.3	2.3	2.3	2.3	2.2	2.1	1.9	1.8	1.7	2.0	2.2	2.1	2.2	2.2	3.12	24
22*	1.9	1.8	1.8	1.7	1.6	1.6	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.7	1.7	1.8	1.7	1.6	1.7	1.8	2.0	2.5	2.3	2.7	1.80	24
23	2.8	2.6	2.5						4.4	4.0	4.0	3.1	2.4	2.2	2.2	2.2	2.2	2.0	1.7	1.7	1.8	1.9	2.2	2.6	2.55	19
24	2.9	2.2	2.6	2.6	2.2	2.0	2.4			2.2	2.1	2.1	2.1	2.0	1.9	1.8	1.8	1.7	1.6	1.7	1.7	1.7	1.9	2.1	2.05	22
25	2.1	1.8	1.9	2.3	2.4	4.5	3.2	3.8	4.4	5.0	4.8	4.4	3.6	3.4	3.2	3.6	3.6	3.6	4.1	4.4	4.0	3.6	3.9	4.3	3.50	24
26	5.0	4.1	4.5	4.6	5.0	5.4	4.6	5.2	5.4	4.2	3.6	3.1	4.5	4.9	3.4	2.4	2.2	2.0	2.1	2.9	3.2	3.1	2.2	2.2	3.71	24
27	3.2	4.5	4.7	3.8	3.3	2.8	2.6	3.4	3.9	3.3	2.8	2.6	2.2	2.2	2.0	1.9	2.1	2.1	1.8	1.9	1.9	1.9	2.0	2.2	2.69	24
28*	2.2	2.0	2.1	2.4	2.6	2.3	2.4	2.9	3.1	3.0	3.1	3.4	2.9	2.6	2.2	2.3	2.3	2.1	1.8	1.7	1.7	1.8	1.7	1.8	2.33	24
29*	2.9	2.8	2.5	2.4	2.2	2.2	2.5	2.2	1.9	1.7	1.8	1.6	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.5	1.6	1.7	1.6	1.6	1.85	24
30	1.5	1.3	1.4	1.6	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.3	1.4	1.5	1.7	2.2	1.33	24
31	1.9	1.6	1.6	1.7	1.4	1.5	1.7	1.9	2.1	2.0	1.9	1.8	1.8	1.9	1.9	1.7	1.9	1.6	1.6	1.9	1.7	1.4	1.4	1.4	1.72	24
MEAN	2.3	2.3	2.7	2.7	2.4	2.5	2.5	2.6	2.7	2.7	2.9	3.0	2.7	2.3	2.2	2.3	2.2	2.1	2.0	2.1	2.2	2.2	2.2	2.2	2.40	
NO	30	30	29	28	28	29	30	29	30	30	29	30	28	27	29	29	29	30	30	29	30	31	31	30		705
MAX	5.0	5.5	5.1	5.9	5.0	6.4	6.1	5.2	5.4	7.7	9.7	11.6	11.4	4.9	3.4	7.0	3.9	3.6	4.1	4.4	5.2	4.5	4.3	4.3	3.71	

* Indicates Saturday or Sunday
Local standard time used

TABULATED: WED., MAY 10, 1967

Figure 11. Readout of hourly summary of pollutant concentrations.

Location: Region, State or Station	Years	Number of Samples	Micrograms Per Cubic Meter													Std Geo Dev
			Min	Frequency Distribution—Percent									Max	Arith Mean	Geo Mean	
				10	20	30	40	50	60	70	80	90				
ALABAMA																
BIRMINGHAM	57	25	50	64	82	90	101	117	127	146	175	214	285	130	117	1.59
	58	20	46	54	96	107	117	127	197	234	359	427	640	211	163	2.09
	59	26	31	50	64	99	117	143	170	187	207	250	449	153	125	1.95
	60	25	38	64	72	83	90	120	151	180	214	286	400	146	122	1.86
	61	26	47	57	64	73	94	107	127	151	203	254	306	131	113	1.75
	57 61	122	31	54	71	90	104	121	151	178	209	281	640	152	126	1.85
MOBILE	58	25	62	76	90	97	102	117	151	254	302	427	485	185	150	1.91
	60	25	29	48	54	76	99	133	145	166	180	241	284	129	108	1.89
	58 60	50	29	54	73	92	101	120	146	180	238	302	485	157	127	1.93
MONTGOMERY	59	25	44	57	64	69	73	80	87	99	107	139	165	87	82	1.40
	61	26	26	42	50	57	60	64	73	81	96	107	157	72	67	1.48
	59 61	51	26	45	56	61	66	73	80	90	102	122	165	79	74	1.46
ALASKA																
ANCHORAGE	57	26	40	45	59	90	127	180	234	266	302	329	338	181	144	2.12
	58	26	24	27	45	85	96	127	145	180	214	234	487	138	106	2.19
	59	25	16	32	35	45	50	64	83	117	127	151	281	93	65	2.07
	60	26	18	28	31	38	64	83	96	107	166	197	269	97	74	2.19
	61	25	19	25	26	38	41	45	64	76	107	151	243	68	54	1.98
	57 61	128	16	27	37	45	67	86	112	142	185	254	487	114	83	2.27
ARIZONA																
PHOENIX	57	26	119	133	145	170	197	230	254	273	302	393	488	247	226	1.32
	58	23	95	107	122	135	151	206	222	234	254	331	410	201	186	1.49
	59	25	60	117	135	180	197	227	254	302	325	359	410	232	208	1.66
	60	25	98	117	127	166	187	207	234	302	376	427	573	247	219	1.63
	61	26	93	107	115	127	160	227	247	264	292	321	409	214	195	1.57
	57 61	125	60	113	127	151	191	218	241	271	307	374	573	229	207	1.58
TUCSON	60	25	36	68	76	114	127	141	151	180	222	246	521	157	135	1.75
	61	23	57	64	94	103	112	127	139	151	166	197	308	131	121	1.50
	60 61	48	36	66	90	104	118	132	146	163	180	230	521	145	128	1.63
ARKANSAS																
LITTLE ROCK	57	26	34	43	54	59	62	76	87	99	120	135	170	84	77	1.54
	58	26	44	54	61	68	72	83	99	107	127	139	190	92	85	1.46
	59	26	31	50	57	64	67	72	76	97	107	117	135	79	74	1.46
	60	26	29	32	38	54	58	64	76	85	101	117	147	72	66	1.57
	61	25	33	40	45	50	54	76	82	90	101	139	169	78	70	1.60
	57 61	129	29	41	51	59	66	73	83	96	110	131	190	81	74	1.53
CALIFORNIA																
BERKELEY	59	25	28	38	45	64	72	107	117	133	145	197	228	102	88	1.79
	61	26	20	36	40	50	57	64	76	117	139	191	286	89	72	1.93
	59 61	51	20	36	42	55	63	74	110	127	142	180	286	95	79	1.86
BURBANK	57 ~	25	41	90	101	120	139	166	180	206	234	359	433	182	156	1.80
	60	26	49	107	135	155	163	176	194	207	241	278	383	196	171	1.55
	57 60	51	41	90	112	137	156	172	188	206	244	331	433	184	163	1.67
FRESNO	58	24	18	19	70	83	101	110	117	127	151	214	377	122	99	2.03
	60	25	45	61	76	90	101	115	123	139	151	173	304	119	109	1.54
	58 60	49	18	57	72	87	101	112	120	131	151	175	377	121	104	1.79
GLENDALE	59	24	93	101	127	143	180	194	207	234	254	302	495	201	184	1.53
	61	24	54	57	70	83	99	107	127	145	161	214	263	121	110	1.55
	59 61	48	54	70	95	105	127	144	168	197	222	266	495	161	143	1.64
LONG BEACH	58	25	68	90	127	145	158	180	191	208	234	393	566	195	169	1.74
	61	26	65	76	90	100	107	133	151	166	191	214	283	140	130	1.49
	58 6.	[illegible]	42	76	96	114	136	155	173	191	210	254	566	167	149	1.64
LOS ANGELES	57	24	89	99	139	161	189	206	234	283	302	345	361	219	201	1.55
	58	[illegible]	111	127	151	170	191	222	238	254	270	286	296	214	206	1.34
	59	23	70	90	107	117	127	151	170	191	214	302	594	180	158	1.63
	60	25	50	90	110	118	124	134	144	180	197	234	344	156	143	1.55
	61	26	83	99	107	133	145	158	169	176	197	214	302	162	154	1.38
	57 61	119	50	99	116	133	155	170	186	208	230	289	594	185	169	1.52

Figure 12. Readout of annual frequency distribution.

used in describing the data because measurements of air quality are distributed more nearly in a "log-normal" pattern than in any other. These parameters are simply the antilogs of the average logarithm and standard deviation of the logarithms of the raw data. In most cases the value at the 50th percentile more nearly approaches the geometric mean than the arithmetic mean. The arithmetic mean tends to be disproportionately inflated by occasional high values that are characteristic of ambient air pollutant measurements.

Frequency Distribution, Seasonal (Figure 13) - This summary is the result of the same calculations as in the annual frequency distribution, but the data are grouped by season. All December, January, and February data are combined in the winter season; March, April, and May are grouped as spring; June, July, and August are grouped as summer; and September, October, and November are grouped as autumn.

Monthly Summary (Figure 14) - This tabulation lists the number of samples collected during the period requested, the maximum and minimum individual sample concentrations, and the average by month.

A simple listing of the data on tape can also be obtained. An example of such a listing is shown in Figure 15, although the exact format may vary with the data requested.

Additional retrieval and summary programs are under consideration and will be developed as warranted by interest and need.

In order to obtain data summaries from the file, a request, which specifies information needed to prepare two request cards for the computer run, is submitted.

The descriptor card (Figure 16) defines the computer program desired (positions 1-30), the geographic and/or site classifications to be included (positions 31-47), and the beginning and terminating dates of the period for which data are to be summarized (positions 48-59). Options for cumulative results of the data being tabulated (position 60) and for headings to be printed on each page (position 61) are provided.

The parameter card (Figure 17) defines from one to seven pollutants on which summaries are desired (positions 1-5, etc.); the methods of sampling and analysis (positions 6 and 7); the sampling interval (position 8); the classification,

Location: Region, State or Station	Season	Number of Samples	Micrograms Per Cubic Meter												Std Geo Dev
			Min	Frequency Distribution—Percent									Max	Arith Mean	Geo Mean	
				10	20	30	40	50	60	70	80	90				
LONG BEACH	WINTER	11	61	64	107	127	151	197	214	302	393	427	566	241	199	1.93
	SPRING	14	48	54	76	90	101	107	127	139	145	214	270	119	108	1.57
	SUMMER	14	69	76	90	107	135	143	151	166	173	197	184	134	128	1.37
	AUTUMN	12	106	107	161	180	189	197	206	214	234	244	238	195	191	1.26
	58 61	51	48	76	96	114	136	155	173	191	210	254	566	167	148	1.64
LOS ANGELES	WINTER	28	58	99	127	139	161	189	214	262	278	302	594	207	183	1.68
	SPRING	35	83	93	101	115	127	146	197	170	180	241	346	155	145	1.42
	SUMMER	28	93	110	118	124	151	173	188	199	206	234	279	170	163	1.35
	AUTUMN	28	50	117	155	163	176	203	241	268	281	302	361	215	197	1.57
	57 61	119	50	99	116	133	155	170	186	204	250	289	594	185	169	1.52
OAKLAND	WINTER	18	53	59	67	70	76	107	120	135	143	214	269	118	104	1.64
	SPRING	19	23	35	45	54	70	76	78	83	88	96	96	68	64	1.48
	SUMMER	18	35	45	64	66	71	76	83	90	99	117	165	81	76	1.47
	AUTUMN	19	57	67	73	90	101	127	133	145	166	197	243	124	115	1.52
	58 61	74	23	47	65	70	75	83	92	107	130	170	289	98	87	1.62
PASADENA	WINTER	13	63	64	83	90	107	127	139	143	151	180	219	125	117	1.47
	SPRING	14	38	38	59	64	107	117	127	158	166	180	186	114	102	1.69
	SUMMER	10	79	90	135	143	151	161	170	180	197	214	381	173	160	1.49
	AUTUMN	12	111	111	115	123	127	151	161	170	197	214	224	150	146	1.25
	57 60	49	38	64	90	114	125	139	151	163	175	200	381	138	126	1.54
RICHMOND	WINTER	12	28	30	32	45	54	76	83	90	107	180	186	83	69	1.86
	SPRING	10	19	19	27	40	42	43	45	68	72	76	98	52	47	1.67
	SUMMER	14	38	38	54	56	60	62	64	80	83	90	93	66	63	1.31
	AUTUMN	12	36	38	54	70	76	80	83	87	107	117	114	78	75	1.38
	58 60	48	19	35	42	48	59	67	76	83	89	104	186	70	63	1.59
SACRAMENTO	WINTER	13	11	11	45	54	64	83	90	107	127	151	403	101	74	2.33
	SPRING	12	14	15	16	54	64	67	70	73	90	107	122	63	54	1.93
	SUMMER	12	32	32	38	59	64	70	76	80	87	90	117	69	65	1.45
	AUTUMN	14	22	23	76	90	107	151	161	180	214	254	264	143	120	1.99
	58 60	51	11	32	48	60	69	78	87	103	135	180	403	96	76	2.01
SAN BERNARDINO	WINTER	18	35	45	64	99	114	127	158	173	180	286	317	151	127	1.89
	SPRING	17	62	83	90	114	127	161	170	191	214	278	338	164	148	1.60
	SUMMER	18	102	151	170	180	203	234	266	290	302	331	349	234	223	1.40
	AUTUMN	16	53	151	166	197	214	241	302	321	359	427	470	260	232	1.72
	57 61	69	35	83	114	145	166	184	210	259	292	334	470	201	175	1.75
SAN DIEGO	WINTER	29	55	64	83	97	107	119	127	151	173	197	241	125	116	1.50
	SPRING	30	27	38	55	58	61	64	79	87	95	102	151	73	69	1.45
	SUMMER	33	45	47	55	59	63	69	74	83	96	120	231	80	73	1.46
	AUTUMN	32	50	54	64	74	82	90	103	115	133	151	233	100	93	1.47
	57 61	124	27	52	59	64	73	83	94	105	122	161	241	94	85	1.54
SAN FRANCISCO	WINTER	32	35	48	57	72	92	100	107	143	186	203	253	113	99	1.72
	SPRING	33	34	36	42	44	49	56	61	67	76	96	156	61	55	1.42
	SUMMER	33	20	24	30	34	40	48	59	70	80	96	117	54	48	1.63
	AUTUMN	30	30	40	46	50	54	69	76	83	90	127	238	78	70	1.59
	57 61	128	20	34	42	47	53	64	74	86	100	145	253	76	66	1.71
SAN JOSE	WINTER	19	23	27	38	90	115	123	127	151	214	278	303	136	104	2.28
	SPRING	19	27	32	59	81	90	101	107	127	139	151	251	105	92	1.74
	SUMMER	19	50	54	76	94	103	112	117	127	137	146	179	108	102	1.43
	AUTUMN	20	66	83	93	99	104	117	133	145	180	214	307	139	129	1.47
	57 61	77	23	50	76	91	102	113	124	137	149	203	307	122	106	1.76
STOCKTON	WINTER	6	20	23	23	45	45	76	83	83	90	90	273	96	71	2.37
	SPRING	7	35	38	38	54	76	107	107	117	127	127	141	92	82	1.69
	SUMMER	6	79	90	90	107	107	135	143	143	151	151	157	128	124	1.30
	AUTUMN	7	94	107	107	127	151	166	166	180	254	254	316	178	165	1.51
	58 58	26	20	45	70	85	96	114	132	141	161	180	316	124	105	1.86
COLORADO DENVER	WINTER	32	56	76	99	132	146	161	175	194	234	278	341	169	154	1.56
	SPRING	32	15	48	59	76	92	100	107	122	145	180	265	107	94	1.75
	SUMMER	28	57	66	72	76	96	101	107	115	120	127	136	97	95	1.25
	AUTUMN	31	39	54	68	80	90	112	127	145	166	214	242	117	104	1.64
	57 61	123	15	60	73	90	100	111	125	142	166	214	341	123	110	1.64

Figure 13. Readout of seasonal frequency distribution.

130 TABLE 217 – BETA RADIOACTIVITY, URBAN AND NONURBAN, MONTHLY STATE SUMMARIES – Continued

(Picocuries Per Cubic Meter)

Region or State	Years	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
ARKANSAS	57 NUMBER					2	2	2	3	2	2	2	2
	MAXIMUM					3.4	1.2	13.8	71.3	4.9	8.4	1.6	1.2
	AVERAGE					2.4	1.1	8.6	26.4	4.4	5.9	1.5	1.2
	MINIMUM					1.4	1.0	3.3	1.9	3.9	3.4	1.4	1.1
	58 NUMBER	2	2	3	2	2	1	3	2	2	2	2	3
	MAXIMUM	2.2	3.5	7.7	5.0	12.6	2.4	8.5	3.7	2.1	7.3	16.5	7.4
	AVERAGE	1.8	2.6	5.1	2.9	9.8	2.4	4.5	3.5	1.1	4.3	14.7	6.0
	MINIMUM	1.4	1.7	2.9	0.7	6.9	2.4	1.1	3.2	0.1	1.3	12.9	3.7
	59 NUMBER	4	5	4	3	5	4	5	5	4	4	5	4
	MAXIMUM	16.8	12.4	16.8	12.9	17.5	1.8	1.9	0.5	0.3	0.2	0.3	0.2
	AVERAGE	12.5	8.3	11.4	9.2	6.6	1.3	0.9	0.3	0.2	0.2	0.2	0.1
	MINIMUM	10.6	2.2	6.7	4.6	1.0	0.9	0.4	0.1	0.1	0.1	0.1	0.1
	60 NUMBER	4	4	4	4	4	4	5	4	5	3	5	4
	MAXIMUM	0.2	0.1	0.2	0.4	0.3	0.3	0.2	0.1	0.2	0.1	0.1	0.1
	AVERAGE	0.1	0.1	0.2	0.3	0.2	0.3	0.1	0.0	0.1	0.1	0.1	0.1
	MINIMUM	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.1	0.1	0.1
	61 NUMBER	4	4	4	4	4	4	4	5	3	5	4	4
	MAXIMUM	0.1	0.1	0.1	0.2	0.2	0.3	0.1	0.1	0.0	23.1	43.9	9.2
	AVERAGE	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	18.3	23.8	6.1
	MINIMUM	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	12.4	8.8	4.1
CALIFORNIA	57 NUMBER	5	4	6	3	17	12	13	13	10	12	15	13
	MAXIMUM	5.6	2.1	5.5	7.3	6.9	350.0	27.3	4.1	11.3	4.6	2.5	6.8
	AVERAGE	2.5	1.5	2.3	5.2	2.5	30.5	4.5	1.8	4.8	2.8	1.6	2.6
	MINIMUM	1.0	0.8	0.2	1.9	0.3	0.4	0.6	0.3	1.7	1.0	0.8	0.4
	58 NUMBER	17	15	18	19	17	19	21	18	17	18	18	19
	MAXIMUM	7.7	2.3	36.0	19.0	12.0	9.5	18.0	7.3	5.0	79.9	126.0	35.8
	AVERAGE	2.5	1.2	8.9	6.7	5.5	2.9	4.3	3.6	2.4	13.8	33.7	10.9
	MINIMUM	0.6	0.6	1.0	1.3	0.3	1.3	0.2	0.3	1.3	0.8	0.5	3.9
	59 NUMBER	14	14	15	15	13	15	14	13	17	12	15	16
	MAXIMUM	33.8	27.0	15.3	15.1	12.0	7.8	2.8	0.7	0.4	0.4	0.4	0.5
	AVERAGE	11.5	9.1	9.3	9.1	7.3	2.7	1.2	0.5	0.2	0.2	0.2	0.2
	MINIMUM	1.6	2.4	3.4	4.1	1.0	0.8	0.3	0.2	0.1	0.1	0.1	0.1
	60 NUMBER	20	21	23	22	19	21	18	24	24	21	19	17
	MAXIMUM	0.3	0.4	0.9	0.5	0.2	0.3	0.2	0.2	0.1	0.1	0.2	0.3
	AVERAGE	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	MINIMUM	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	61 NUMBER	18	19	23	22	20	18	21	24	20	21	21	21
	MAXIMUM	0.2	0.1	0.2	0.2	0.5	0.7	0.2	0.1	19.8	48.6	73.7	30.2
	AVERAGE	0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.0	5.1	20.6	22.7	9.7
	MINIMUM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.4	1.8
COLORADO	57 NUMBER	2	2	1	1	2	2	2		2	2	2	3
	MAXIMUM	3.3	1.8	2.1	4.6	5.7	21.4	106.3		159.2	63.1	1.5	3.2
	AVERAGE	2.5	1.6	2.1	4.6	3.4	18.0	85.3		86.6	32.1	0.9	2.2
	MINIMUM	1.7	1.3	2.1	4.6	1.0	14.6	64.2		14.0	1.0	0.2	1.6
	58 NUMBER	4	4	5	4	3	3	6	5	3	4	6	4
	MAXIMUM	3.0	2.1	8.6	17.0	9.2	15.0	49.0	8.8	4.9	26.8	29.1	11.9
	AVERAGE	2.3	1.7	3.7	10.6	6.6	8.4	18.3	5.4	3.1	9.6	13.9	8.7
	MINIMUM	1.4	1.3	0.6	8.3	3.1	4.6	5.5	3.5	1.2	2.5	4.3	4.6
	59 NUMBER	4	3	4	5	4	4	3	3	4	4	4	4
	MAXIMUM	16.2	14.9	18.0	39.4	15.3	2.8	1.0	0.4	0.7	0.2	0.3	0.2
	AVERAGE	11.5	10.5	13.4	13.3	6.4	2.0	0.9	0.3	0.4	0.2	0.2	0.1
	MINIMUM	8.3	7.6	4.7	1.8	1.7	1.3	0.6	0.2	0.2	0.1	0.1	0.0
	60 NUMBER	4	1	4	4	4	3	4	5	3	4	4	4
	MAXIMUM	0.3	0.5	0.8	0.4	0.5	0.3	0.2	0.1	0.1	0.3	0.1	0.1
	AVERAGE	0.2	0.5	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.1	0.1
	MINIMUM	0.1	0.5	0.0	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.0	0.1
	61 NUMBER	4	4	5	4	4	4	4	5	4	5	3	4
	MAXIMUM	0.1	0.1	0.1	0.2	0.5	0.2	0.1	0.1	26.1	33.6	17.3	28.4
	AVERAGE	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	9.6	19.5	9.8	19.7
	MINIMUM	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	7.4	3.2	13.7

Figure 14. Readout of monthly summary.

AIR QUALITY DATA BANK

LISTED 8/20/65

Hartford, Connecticut

Method Codes Date	91 SP*	91 BS**
620104	127	8.4
620120	76	6.7
620204	169	13.4
620223	278	8.9
620303	78	5.6
620317	100	5.1
620330	222	13.4
620410	109	7.7
620426	136	6.0
620508	65	4.3
620522	144	8.6
620605	90	7.6
620621	78	5.9
620706	63	4.1
620721	100	4.2
620804	251	11.8
620815	73	3.3
620831	178	14.0
620915	116	7.0
620930	79	8.9
621009	102	6.6
621025	85	5.2
621106	64	8.5
621121	293	39.2
621207	67	5.1
621221	122	9.6

*Suspended particulates.
**Benzene soluble organic fraction.

Figure 15. Raw data listing.

Layout Form — 80 Column Card

| R X | Program | | |

Layout Form — 80 Column Card

R X	Pollutant					Pollutant					Pollutant					Pollutant					Pollutant					Pollutant					Pollutant					
	Code	Meth.	Int.	Class.	Source	Code	Meth.	Int.	Class.	Source	Code	Meth.	Int.	Class.	Source	Code	Meth.	Int.	Class.	Source	Code	Meth.	Int.	Class.	Source	Code	Meth.	Int.	Class.	Source	Code	Meth.	Int.	Class.	Source	Card #
0	0 0 0 0 0	0 0	0	0	0 0	0 0 0 0 0	0 0	0	0	0 0	0 0 0 0 0	0 0	0	0	0 0	0 0 0 0 0	0 0	0	0	0 0	0 0 0 0 0	0 0	0	0	0 0	0 0 0 0 0	0 0	0	0	0 0	0 0 0 0 0	0 0	0	0	0 0	0 0
	1 2 3 4 5	6 7	8	9	10 11	12 13 14 15 16	17 18	19	20	21 22	23 24 25 26 27	28 29	30	31	32 33	34 35 36 37 38	39 40	41	42	43 44	45 46 47 48 49	50 51	52	53	54 55	56 57 58 59 60	61 62	63	64	65 66	67 68 69 70 71	72 73	74	75	76 77	78 79 80
1	1 1 1 1 1	1 1	1	1	1 1	1 1 1 1 1	1 1	1	1	1 1	1 1 1 1 1	1 1	1	1	1 1	1 1 1 1 1	1 1	1	1	1 1	1 1 1 1 1	1 1	1	1	1 1	1 1 1 1 1	1 1	1	1	1 1	1 1 1 1 1	1 1	1	1	1 1	1 1 1
2	2 2 2 2 2	2 2	2	2	2 2	2 2 2 2 2	2 2	2	2	2 2	2 2 2 2 2	2 2	2	2	2 2	2 2 2 2 2	2 2	2	2	2 2	2 2 2 2 2	2 2	2	2	2 2	2 2 2 2 2	2 2	2	2	2 2	2 2 2 2 2	2 2	2	2	2 2	2 2 2
3																																				
4																																				
5	Restrictions:																																			
6	a. Only one card No. 2 per computer run.																																			
7	b. Only one family category per card.																																			
8	8 8 8

i.e., routine, nonroutine, etc. (position 9); and the source or contributing agency (positions 10 and 11). This card may be used to recall data on individual pollutants or on one family of pollutants. The following restrictions must be imposed because of limitations on the amount of memory available in the computer:

1. Only one parameter card may be used in each computer run.
2. Only one family may be requested in each computer run.

APPENDIX

Codes Assigned for Some Common Pollutants

Table A-1. POLLUTANT AND METHOD-ANALYSIS CODES FOR SOME COMMON AEROMETRIC DATA

Pollutant	Units	Pollutant code	Method of collection and analysis		Method code
Suspended particulates					
Total suspended solids	$\mu g/m^3$	11101	Hi-Vol	Gravimetric	91
Total organic fraction	$\mu g/m^3$	11102	Hi-Vol	Ignition - gravimetric	91
Benzene soluble organics	$\mu g/m^3$	11103	Hi-Vol	Benzene extraction Soxhlet	91
Total polynuclear hydrocarbons	$\mu g/m^3$	11104	Hi-Vol	Piperonyl chloride	91
Reflectance (smoke shade)	Ruds	11202	Smoke shade instrument		91
Transmission (dirt shade)	Cohs	11201	AISI		81
Radioactivity, (gross beta)	PCi/m^3	11302	Hi-Vol	Proportional counter	91
Antimony	$\mu g/m^3$	12102	Hi-Vol	Emission spectra	91
Arsenic	$\mu g/m^3$	12103	Hi-Vol	NASN arsine-colorimetric	93
Beryllium	$\mu g/m^3$	12105	Hi-Vol	Emission spectra	91
Beryllium	$\mu g/m^3$	12105	Hi-Vol	Morin method	93
Bismuth	$\mu g/m^3$	12105	Hi-Vol	Atomic absorption	92
Chronium	$\mu g/m^3$	12106	Hi-Vol	Emission spectra	91
Chronium	$\mu g/m^3$	12112	Hi-Vol	Emission spectra	91
Cobalt	$\mu g/m^3$	12112	Hi-Vol	Atomic absorption	92
Cobalt	$\mu g/m^3$	12113	Hi-Vol	Atomic absorption	92
Copper	$\mu g/m^3$	12113	Hi-Vol	Emission spectra	91
Copper	$\mu g/m^3$	12114	Hi-Vol	Emission spectra	91
Iron	$\mu g/m^3$	12114	Hi-Vol	Atomic absorption	92
Lead	$\mu g/m^3$	12126	Hi-Vol	Emission spectra	91
Lead	$\mu g/m^3$	12128	Hi-Vol	Atomic absorption	92
Manganese	$\mu g/m^3$	12128	Hi-Vol	Emission spectra	91
Manganese	$\mu g/m^3$	12132	Hi-Vol	Emission spectra	91
Molybdenum	$\mu g/m^3$	12132	Hi-Vol	Atomic absorption	92
Nickel	$\mu g/m^3$	12134	Hi-Vol	Emission spectra	91
Nickel	$\mu g/m^3$	12136	Hi-Vol	Atomic absorption	92
Nickel	$\mu g/m^3$	12136	Hi-Vol	Emission spectra	91
Tin	$\mu g/m^3$	12136	Hi-Vol	Heptoxime (colorimetric)	94
Titanium	$\mu g/m^3$	12160	Hi-Vol	Emission spectra	91
Titanium	$\mu g/m^3$	12161	Hi-Vol	Emission spectra	91
Vanadium	$\mu g/m^3$	12161	Hi-Vol	Atomic absorption	92
Zinc	$\mu g/m^3$	12164	Hi-Vol	Emission spectra	91
Zinc	$\mu g/m^3$	12167	Hi-Vol	Atomic absorption	92
	$\mu g/m^3$	12167	Hi-Vol	Emission spectra	91
Non-metal inorganics					
Ammonium NH_4^+	$\mu g/m^3$	12301	Hi-Vol	Nessler	91
Ammonium NH_4^+	$\mu g/m^3$	12301	Hi-Vol	Sodium phenolate	92
Benzo (a) pyrene	$\mu g/m^3$	17242	Hi-Vol	Thin layer chromatography + fluorometry	91
Bromide	$\mu g/m^3$	12201	Hi-Vol	Phenol-red	41
Chloride	$\mu g/m^3$	12203	Hi-Vol	Thiocyanate	91
Chloride	$\mu g/m^3$	12203	Hi-Vol	Argentometric	92
Chloride	$\mu g/m^3$	12203	Hi-Vol	Mercuric nitrate	93
Hydrogen ion concentration (pH)	pH	12602	Hi-Vol	pH meter	91
Nitrates (NO_3^-)	$\mu g/m^3$	12306	Hi-Vol	2-4 Xylenol	91
Nitrates (NO_3^-)	$\mu g/m^3$	12306	Hi-Vol	Reduction-diazo coupling	92

Table A-1 (continued). POLLUTANT AND METHOD-ANALYSIS CODES FOR SOME COMMON AEROMETRIC DATA

Pollutant	Units	Pollutant code	Method of collection and analysis		Method code
Nitrite (NO_2^-)	$\mu g/m^3$	12309	Hi-Vol	Diazo coupling	91
Phosphate (PO_4)	$\mu g/m^3$	12454	Hi-Vol	Molybdate - stannous chloride	91
Sulfuric acid	$\mu g/m^3$	12402	Hi-Vol	pH	61
Sulfate (SO_4^{2-})	$\mu g/m^3$	12403	Hi-Vol	Methylthymol blue-colorimetric	91
Sulfate (SO_4^{2-})	$\mu g/m^3$	12403	Hi-Vol	Turbidimetric (NASN)	92
Settled particulates - dust fall (all units expressed on monthly basis)					
Total particulates	$\mu g/m^2/mo$	21101	APCA	Gravimetric	71
Total particulates	$\mu g/m^2/mo$	21101	ASTM	Gravimetric	81
Total organic fraction	$\mu g/m^2/mo$	21102	APCA	Ignition-gravimetric	71
Total organic fraction	$\mu g/m^2/mo$	21102	ASTM	Ignition-gravimetric	81
Benzene soluble organics	$\mu g/m^2/mo$	21103	APCA	Soxhlet	71
Benzene soluble organics	$\mu g/m^2/mo$	21103	ASTM	Soxhlet	81
Water soluble weight	$\mu g/m^2/mo$	21114	APCA	Gravimetric	71
Water soluble weight	$\mu g/m^2/mo$	21114	ASTM	Gravimetric	81
Water insoluble weight	$\mu g/m^2/mo$	21115	APCA	Gravimetric	71
Water insoluble weight	$\mu g/m^2/mo$	21115	ASTM	Gravimetric	81
Total weight ash	$\mu g/m^2/mo$	21116	APCA	Gravimetric	71
Total weight ash	$\mu g/m^2/mo$	21116	ASTM	Gravimetric	81
Water soluble ash	$\mu g/m^2/mo$	21117	APCA	Gravimetric	71
Water soluble ash	$\mu g/m^2/mo$	21117	ASTM	Gravimetric	81
Water insoluble ash	$\mu g/m^2/mo$	21118	APCA	Gravimetric	71
Water insoluble ash	$\mu g/m^2/mo$	21118	ASTM	Gravimetric	81
Chloride	$\mu g/m^2/mo$	22203	APCA	Mercuric nitrate	71
Chloride	$\mu g/m^2/mo$	22203	ASTM	Mercuric nitrate	81
Chloride	$\mu g/m^2/mo$	22203	APCA	Mohr	72
Chloride	$\mu g/m^2/mo$	22203	ASTM	Mohr	82
Chloride	$\mu g/m^2/mo$	22203	APCA	Volhard	73
Chloride	$\mu g/m^2/mo$	22203	ASTM	Volhard	83
Chloride	$\mu g/m^2/mo$	22203	APCA	Automated thiocyanate	74
Chloride	$\mu g/m^2/mo$	22203	ASTM	Automated thiocyanate	84
Ammonium	$\mu g/m^2/mo$	22301	APCA	Sodium phenolate	71
Ammonium	$\mu g/m^2/mo$	22301	ASTM	Sodium phenolate	81
Ammonium	$\mu g/m^2/mo$	22301	APCA	Nessler	72
Ammonium	$\mu g/m^2/mo$	22301	ASTM	Nessler	82
Nitrates	$\mu g/m^2/mo$	22306	APCA	2-4 Xylenol	71
Nitrates	$\mu g/m^2/mo$	22306	ASTM	2-4 Xylenol	81
Nitrates	$\mu g/m^2/mo$	22306	APCA	Reduction diazo	72
Nitrates	$\mu g/m^2/mo$	22306	ASTM	Reduction diazo	82
Sulfates	$\mu g/m^2/mo$	22403	APCA	NASN, turbidimetric	71
Sulfates	$\mu g/m^2/mo$	22403	ASTM	NASN, turbidimetric	81
Sulfates	$\mu g/m^2/mo$	22403	APCA	Methylthymol blue	72
Sulfates	$\mu g/m^2/mo$	22403	ASTM	Methylthymol blue	82
Sulfates	$\mu g/m^2/mo$	22403	APCA	Barium sulfate	73
Sulfates	$\mu g/m^2/mo$	22403	ASTM	Barium sulfate	83
pH	pH units	22602	APCA	pH meter	71
pH	pH units	22602	ASTM	pH meter	81

Table A-1 (continued). POLLUTANT AND METHOD-ANALYSIS CODES FOR SOME COMMON AEROMETRIC DATA

Pollutant	Units	Pollutant code	Method of collection and analysis	Method code
Sulfation rate				
Sulfation rate	$mgSO_3/100cm^2/day$	42410	NASN Candle - gravimetric	91
Sulfation rate	$mgSO_3/100cm^2/day$	42410	NASN Candle - colorimetric (methylthymol blue)	92
Sulfation rate	$mgSO_3/100cm^2/day$	42410	NASN Candle - titrimetric	93
Sulfation rate	$mgSO_3/100cm^2/day$	42410	RAC Candle - gravimetric	81
Sulfation rate	$mgSO_3/100cm^2/day$	42410	RAC Candle - colorimetric	82
Sulfation rate	$mgSO_3/100cm^2/day$	42410	RAC Candle - titrimetric	83
Carbon monoxide	$\mu g/m^3$	42101	Instrumental - infra-red	11
Carbon dioxide	$\mu g/m^3$	42102	NASN Sampler (100-ml tube + orifice)+ phenolphthalein method	91
Hydrogen sulfide	$\mu g/m^3$	42402	NASN Sampler (100-ml tube + orifice)+ methylene blue method	91
Ammonia	$\mu g/m^3$	42604	NASN Sampler (100-ml tube + orifice) + Nessler reagent	91
Ammonia	$\mu g/m^3$	42604	NASN Sampler (100-ml tube + orifice) + sodium phenolate	92
Nitric oxide	$\mu g/m^3$	42601	Instrumental - colorimetric	11
Nitric oxide	$\mu g/m^3$	42601	NASN Sampler (50-ml tube + orifice)+ Saltzman method	71
Nitric oxide	$\mu g/m^3$	42601	NASN Sampler (100-ml tube + orifice) + Saltzman method	91
Nitrogen dioxide	$\mu g/m^3$	42602	Instrumental - colorimetric	12
Nitrogen dioxide	$\mu g/m^3$	42602	NASN Sampler (50-ml tube + orifice) + Saltzman method	72
Nitrogen dioxide	$\mu g/m^3$	42602	NASN Sampler (100-ml tube + orifice) + Saltzman method	82
Nitrogen dioxide	$\mu g/m^3$	42602	NASN Sampler (50-ml tube + orifice) + Jacobs-Hochheiser method	71
Nitrogen dioxide	$\mu g/m^3$	42602	NASN Sampler (100-ml tube + orifice) + Jacobs-Hochheiser method	81
Nitrogen dioxide	$\mu g/m^3$	42602	NASN Sampler (100-ml tube + frit) Saltzman method	92
Nitrogen dioxide	$\mu g/m^3$	42602	NASN Sampler (100-ml tube + frit) Jacobs-Hochheiser method	91
Oxides of nitrogen	$\mu g/m^3$	42403	Instrumental - colorimetric	11
Sulfur dioxide	$\mu g/m^3$	42401	NASN Sampler (50- or 100-ml tube+orifice) West-Gaeke sulfamic acid	91
Sulfur dioxide	$\mu g/m^3$	42401	NASN (50- or 100-ml tube + orifice) West-Gaeke	92
Sulfur dioxide	$\mu g/m^3$	42401	Instrumental - West-Gaeke	11
Sulfur dioxide	$\mu g/m^3$	42401	NASN - conductametric	93
Sulfur dioxide	$\mu g/m^3$	42401	Instrumental - conductametric	13
Total hydrocarbons	$\mu g/m^3$	43101	Instrumental-flame ionization	11
Methane	$\mu g/m^3$	43201	Instrumental-flame ionization	11
Methane	$\mu g/m^3$	43201	Manual - gas chromatography using flame ionization	91

Table A-1 (continued). POLLUTANT AND METHOD-ANALYSIS CODES FOR SOME COMMON AEROMETRIC DATA

Pollutant	Units	Pollutant code	Method of collection and analysis	Method code
Non-methane hydrocarbon	$\mu g/m^3$	43102	Instrumental-flame ionization	11
Ethane	$\mu g/m^3$	43202	Manual - gas chromatography using flame ionization	91
Ethylene	$\mu g/m^3$	43203	Manual-gas chromatography using flame ionization	91
Acetylene	$\mu g/m^3$	43206	Manual - gas chromatography using flame ionization	91
Propane	$\mu g/m^3$	43204	Manual - gas chromatography using flame ionization	91
Propylene	$\mu g/m^3$	43205	Manual - gas chromatography using flame ionization	91
N-butane	$\mu g/m^3$	43212	Manual - gas chromatography using flame ionization	91
Isobutane	$\mu g/m^3$	43214	Manual - gas chromatography using flame ionization	91
Butene	$\mu g/m^3$	43213	Manual - gas chromatography using flame ionization	91
2,2-Dimethylpropane	$\mu g/m^3$	43222	Manual - gas chromatography using flame ionization	91
Isobutylene	$\mu g/m^3$	43215	Manual - gas chromatography using flame ionization	91
Trans-2-butene	$\mu g/m^3$	43216	Manual - gas chromatography using flame ionization	91
Cis-2-butene	$\mu g/m^3$	43217	Manual - gas chromatography using flame ionization	91
Isopentane	$\mu g/m^3$	43221	Manual - gas chromatography using flame ionization	91
N-Pentane	$\mu g/m^3$	43220	Manual - gas chromatography using flame ionization	91
3 Methylbutene-1	$\mu g/m^3$	43223	Manual - gas chromatography using flame ionization	91
1,3-Butadiene	$\mu g/m^3$	43218	Manual - gas chromatography using flame ionization	91
Total oxidants	$\mu g/m^3$	44101	Instrumental - alkaline KI	11
Total oxidants	$\mu g/m^3$	44101	Instrumental - mast model 742-2	13
Total oxidants	$\mu g/m^3$	44101	Instrumental - neutral KI	14
Total oxidants	$\mu g/m^3$	44101	NASN Sampler - ferrous oxidation	82
Total oxidants	$\mu g/m^3$	44101	NASN Sampler - alkaline KI	81
Aldehyde	$\mu g/m^3$	48501	NASN Sampler - MBth	91